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Process Framework for Identifying and Prioritizing Water Quality Improvement for Meeting TMDLs in Texas

by

Samantha Lye-Ming Hon, M.S.E.
Michael E. Barrett, Ph.D.
Joseph F. Malina, Jr., Ph.D.

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Center for Research in Water Resources
The University of Texas at Austin
J.J. Pickle Research Campus
Austin, TX 78712-4497

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1 INTRODUCTION

1.1 Problem Identification

The United States Congress enacted the Clean Water Act in 1972 in response to growing public concern about serious and widespread water quality problems in the United States. The objectives of the Clean Water Act are the restoration and maintenance of the integrity of our nation's navigable streams, including lakes, rivers, and coastal areas. This objective translates into two fundamental goals: elimination of the discharge of pollutants into the nation's waters and achievement of water quality levels that result in water that is fishable and swimmable.

Water quality problems can be attributed to point sources and nonpoint sources of pollutants. Point sources usually consist of discharges from municipal and industrial wastewater treatment plants. Conversely, nonpoint sources are diffuse such as agricultural and stormwater runoff. Nonpoint source pollution results from stormwater and melting snow moving over and through the ground, finally ending up in receiving water bodies.

The U.S. Environmental Protection Agency (EPA) estimates that over 20,000 water bodies across America do not support designated beneficial uses. These waters include over 300,000 miles of river and shoreline and 5 million acres of lakes. Over 40% of assessed waters do not meet water quality standards set by the states, territories, and authorized tribes. Many states in the U.S. identify nonpoint source pollution as the leading remaining cause of water quality problems. This discovery prompted the Clean Water Act to be amended in 1987 to include the Nonpoint Source Management Program. This program was established to help states address nonpoint source pollution by identifying water

bodies affected by such pollution and adopting and implementing management strategies to control it.

The Texas Commission on Environmental Quality (TCEQ) is responsible for setting water quality standards for water bodies within Texas and also compiling The State of Texas Water Quality Inventory that is required under the Clean Water Act Section 305(b). The Section 305(b) report contains the results of monitoring and assessments performed by TCEQ, in collaboration with federal, regional, and local agencies, to determine which water bodies meet standards set for their use and which do not.

This report and other available water quality data and information are used as the basis to produce The State of Texas List of Impaired Water Bodies as required under the Clean Water Act Section 303(d). The 2002 Draft Section 303(d) List for the state of Texas is presented in Appendix A. The water bodies on the Section 303(d) list do not meet Texas water quality standards even after the minimum required pollution control technology has been installed by point source contributors. The major impairments in Texas according to the 2002 Draft 303(d) list are caused by bacteria, low dissolved oxygen concentration, pH, mercury, and dioxin. This information is summarized in Table 1-1.

Table 1-1: Major Causes of Water Body Impairments in Texas

Constituent	Number of Water Bodies Impaired
Bacteria	192
Low Dissolved Oxygen Concentration	104
pH	15
Mercury	14
Dioxin	13

Section 303(d) requires that priority rankings for the impaired water bodies on the Section 303(d) list be established and a Total Maximum Daily Load

(TMDL) be developed. A TMDL specifies the maximum amount of a pollutant that can assimilated by a water body while still meeting water quality standards and maintaining beneficial uses. The TMDL also allocates pollutant loadings among point and nonpoint sources of pollution.

An implementation plan must be developed to reduce pollutant loads once TMDLs are established. An example would be the creation of more stringent wastewater permit limits so that treatment plants that are contributing to the impairment of a water body are required to implement additional or new treatment technologies. Cities also may be asked to implement Best Management Practices (BMPs) to reduce or treat runoff from urban areas including roads and highways.

The individuals and organizations who use the water resource, or contribute or control pollution to the water body are the watershed stakeholders in a TMDL project. The Texas Department of Transportation (TxDOT) is a watershed stakeholder and may be required to implement BMPs to reduce their contribution of the pollutant.

1.2 Background Information about TMDLs

All states must develop a list of impaired water bodies (Section 303(d) list) and submit the list to EPA every even-numbered year under the current TMDL program. The states also must submit the methodology used to develop the list and identify waters that are targeted for TMDL development within the next 2 years. The calculations used to establish the TMDLs are subject to public review within the state. EPA has 30 days to approve or disapprove a list and the TMDLs submitted by a state. If EPA disapproves either the list or an individual TMDL, EPA has 30 days to establish the list or the TMDL and seek public comment. The states have to develop schedules for establishing TMDLs.

Schedules generally are developed within 8-13 years of the water body being listed. Finally, all states must come up with an implementation plan for load allocations for water bodies impaired solely or primarily by nonpoint sources. Texas already has completed a number of TMDLs and waste load allocations. EPA approved TMDLs for 12 different water bodies in Texas in 1998. This list included 8 types of pollutants. A list of water bodies with TMDLs for pollutants that are already approved by EPA is shown in Table 1-2. TCEQ has initiated a "TMDLs in 10 Years" program that is committed to developing TMDLs for the 147 water bodies listed on the 1998 Texas 303(d) List by 2009.

Table 1-2: Summary of Water Bodies with Current EPA-Approved TMDLs

County	Water body Name	Pollutant with EPA Approved TMDL
Henderson/Navarro	Upper Trinity River	Chlordane
Tarrant	West Fork Trinity River Below Lake Worth	Chlordane
Tarrant	Fosdic Lake	Chlordane, Dieldrin, DDE, PCPs
Tarrant	Echo Lake	PCBs
Tarrant	Clear Fork Trinity River Below Benbrook Lake	Chlordane
Tarrant	Lake Como	Chlordane, Dieldrin, DDE, PCPs
Dallas	Lower West Fork Trinity River	Chlordane
Dallas	Mountain Creek Lake	Heptachlor epoxide
Galveston/Harris	Clear Creek Tidal	Chlordane
Galveston/Harris	Clear Creek Above Tidal	Chlordane
Cameron	Arroyo Colorado Above Tidal	Chlordane, DDE, Toxaphene
Hidalgo	Donna Reservoir	PCBs

An implementation plan needs to be carried out once TMDLs are established. Watershed action plans will be the basis for initiating local, regional, and state actions that reduce pollutant loads. The individuals and organizations who use the water resource, or contribute or control pollution to the water body are the watershed stakeholders. The watershed stakeholders can consist of wastewater dischargers, individuals representing agriculture and aquaculture organizations, businesses, members of the public, and government agencies. The watershed stakeholders are expected to work with TCEQ or other lead organizations on the planning of the TMDL project, data collection, setting of the water quality target, allocation of pollutant loads, the development of an implantation plan, and the implementation of this plan. A flow chart of the TMDL process is presented in Figure 1-1.

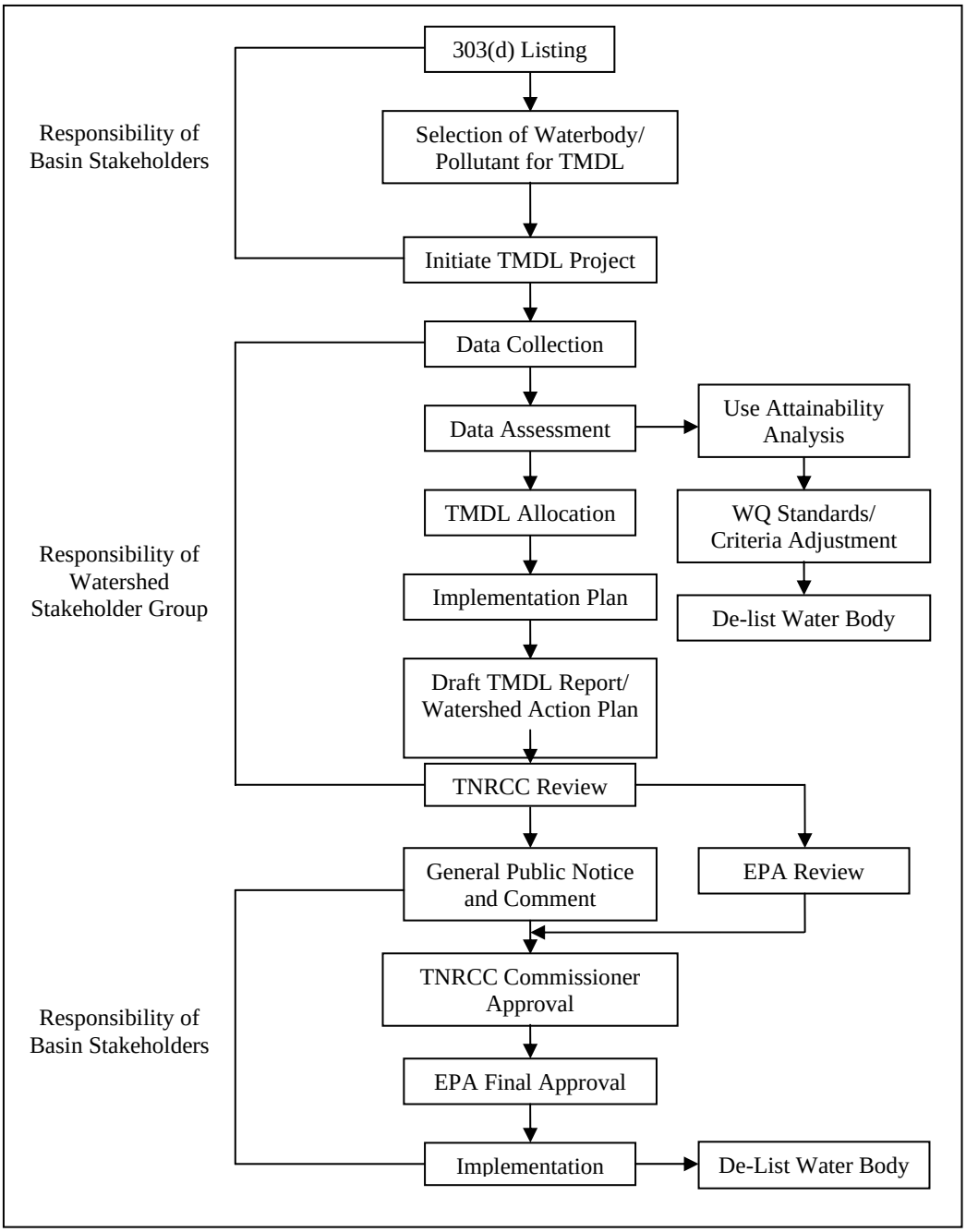

Figure 1-1: General Process for TMDL Development

1.3 Objectives

TxDOT is a potential stakeholder in the TMDL process and may be required to implement BMPs to reduce contributions of a particular pollutant to receiving water bodies. The implementation of BMPs may be required for new construction or for highways undergoing rehabilitation or repair within the contributing watershed of the impaired water bodies. Project delays and cost overruns could be the result of these requirements, if the need for BMP implementation is not identified early in the planning process. Therefore, the objectives of this research are guidelines for TxDOT in anticipation of the requirements of the TMDL process and the development of a database for TxDOT to respond to identification of contributors to impairment.

1.4 Scope of Work

The following tasks were completed to evaluate TxDOT's potential liability under the TMDL ruling:

1. Development of a GIS coverage of impaired segments that are on the most recent 303(d) list for Texas with the map of state highways and roads overlain
2. Compilation of the constituents of concern that are responsible for the impairment linked to the GIS coverage
3. Compilation of highway runoff monitoring data from around the state
4. A comparison of the concentrations of highway runoff with appropriate water quality standards
5. Development of a toolbox of appropriate BMPs for highway use that target specific constituents that TxDOT may implement if required by the TMDL process

6. Development of a methodology for the identification of needed improvements and prioritization of the addition of water quality structures to meet the TMDL requirements

2 LITERATURE REVIEW

A stormwater BMP is defined by the U.S. Environmental Protection Agency (EPA) as a technique, measure, or structural control that is used for a given set of conditions to manage the quantity and improve the quality of storm water runoff in the most cost-effective manner. The primary purpose of a BMP is the protection of the beneficial uses of water resources through the reduction of pollutant loadings and concentrations. There are two main categories of BMPs: structural and non-structural. Structural BMPs improve the quality and/or control the quantity of runoff. These structures include infiltration, detention, retention, constructed wetland, filtration, and vegetated systems. Non-structural BMPs include a range of pollution prevention, education, institutional, management, and development practices that serve to limit the conversion of rainfall to runoff and prevent pollutants from entering runoff at the source of runoff generation. The structural BMPs that are appropriate for use on TxDOT facilities and address specific water quality constituents causing impairment to segments on the 303(d) list will be discussed in detail. These BMPs include sand filters, extended detention basins, wet basins, infiltration basins, infiltration trenches, vegetated swales, and vegetated buffer strips. The constituents of interest are total suspended solids (TSS), total Kjeldahl nitrogen (TKN), nitrate nitrogen (NO_3-N), total nitrogen (TN), total phosphorus (TP), total zinc, and fecal coliform. TN was taken as the sum of both TKN and nitrate. These constituents are of interest because most of the impairments in the state are caused by bacteria and low dissolved oxygen concentrations. Low dissolved oxygen concentration is caused by the die-off of algae and other plants that grow in the presence of excessive amount of nutrients like nitrogen and phosphorus. TSS is a constituent of interest because it is an important component of highway runoff. The performance of

each of these BMPs in removing the respective pollutants was assessed to determine the effectiveness of each of these BMPs.

2.1 Sand Filters

A sand filter is a filtration device that uses sand to remove particulate constituents found in storm water. Two of the more common types of sand filters are the "Austin" style sand filter and "Delaware" style sand filter (Caltrans, 2003a).

One configuration of the Austin design is known as full sedimentation and consists of a separate sedimentation basin followed by an open-air filter. A concrete wall separates the sedimentation basin and the filter chamber. The effluent from the sedimentation basin flows through a perforated riser that transfers the runoff to the filter chamber. An orifice plate on the outlet of the riser is sized so that the sedimentation basin drains completely from basin-full conditions in 24 hours. An example of an Austin sand filter is shown in Figure 2-1.

The Delaware unit that is shown in Figure 2-2, operates along the curbside edge of paved areas and parking lots and requires the least area for installation among the various sand filter types. The device consists of separate sedimentation and filter chambers, but differs from the Austin design in that a permanent pool is maintained in the sedimentation chamber. Ideally, runoff enters the sedimentation chamber as sheet flow. As runoff enters the chamber, water remaining in the device from previous storms is displaced and flows over a weir into the sand filter chamber.

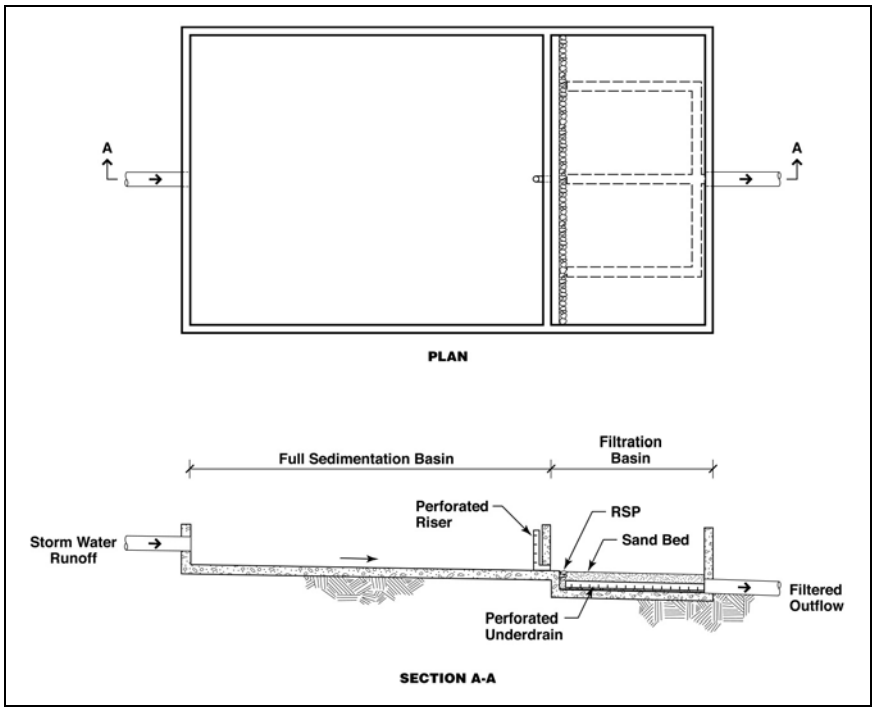

Figure 2-1: Schematic of an Austin Sand Filter (Caltrans, 2003a)

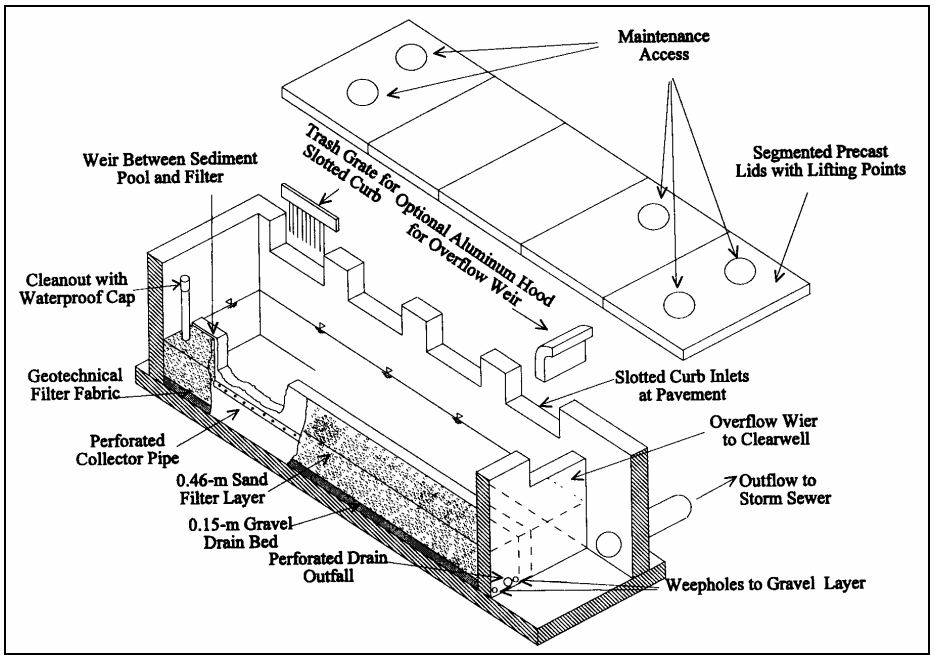

Figure 2-2: Schematic of a Delaware Sand Filter (Caltrans, 2003a)

The pollutant removal efficiencies of an Austin sand filter that was studied in a BMP retrofit pilot program conducted by the California Department of Transportation (Caltrans, 2003a) are summarized in Table 2-1. The Event Mean Concentration (EMC) is an average concentration for a storm calculated using concentrations from several discrete samples which are weighted according to the amount of flow that was passing the collection point around the time each sample was taken. Significance is the probability that the influent and effluent concentrations are not significantly different based on an analysis of variance (ANOVA). A significance probability of less than 0.10 indicates that the influent and effluent concentrations are significantly different at the 90% confidence interval. The Delaware sand filter also was studied as part of the Caltrans project (Caltrans, 2003a). The results are summarized in Table 2-2.

Table 2-1: Performance of Austin Sand Filters

Constituent	Mean EMC*		Removal %	Significance P**
	Influent (mg/L)	Effluent (mg/L)		
TSS	90	8.6	90	< 0.000
TKN	3.12	1.48	53	0.002
Nitrate	0.66	1.10	-67	0.009
TN	3.78	2.58	32	NA
TP	0.41	0.25	39	0.003
Total Zinc	0.236	0.047	80	< 0.000
Fecal Coliform (MPN/100mL)	5800	1600	72	0.190

* EMC – Event Mean Concentration

** Significance P – Probability that concentrations are not significantly different

Table 2-2: Performance of Delaware Sand Filters

Constituent	Mean EMC*		Removal %	Significance P**
	Influent (mg/L)	Effluent (mg/L)		
TSS	102	19	81	< 0.000
TKN	1.91	1.22	36	0.059
Nitrate	0.35	0.84	-142	0.016
TN	2.26	2.06	9	NA
TP	0.37	0.21	41	0.049
Total Zinc	0.429	0.033	92	< 0.000
Fecal Coliform (MPN/100mL)	5800	1200	79	0.435

* EMC – Event Mean Concentration
** Significance P – Probability that concentrations are not significantly different

The results observed for both sand filters were similar. Constituent removal generally was good, except for nutrients. Nitrate concentrations in particular increased. A probable reason for this increase is biological nitrification of ammonia in the sand filters.

2.2 Extended Detention Basins

Traditional detention basins are designed to intercept a volume of water, temporarily impound the runoff and release the water shortly after the storm event. Therefore, the main purpose of a detention basin is quantity control by reducing the peak flow rate of storm runoff. Most basins are designed to drain in less than 24 hours but an extended detention basin can release the runoff over a 72-hour period. Extended detention basins generally are used to remove suspended solids and associated contaminants by gravitational sedimentation. The removal of other constituents that can affect water quality is limited (Caltrans, 2003a).

The basic design criteria for the basins involve detention time, length/width ratio, and depth. Other design criteria include side slope ratio, maintenance access, basin shape, inlet/outlet type, and in-line or off-line configuration, and lined or unlined. An unlined basin is shown in Figure 2-3. The performance of unlined extended detention basins is illustrated in Table 2-3 (Caltrans, 2003a).

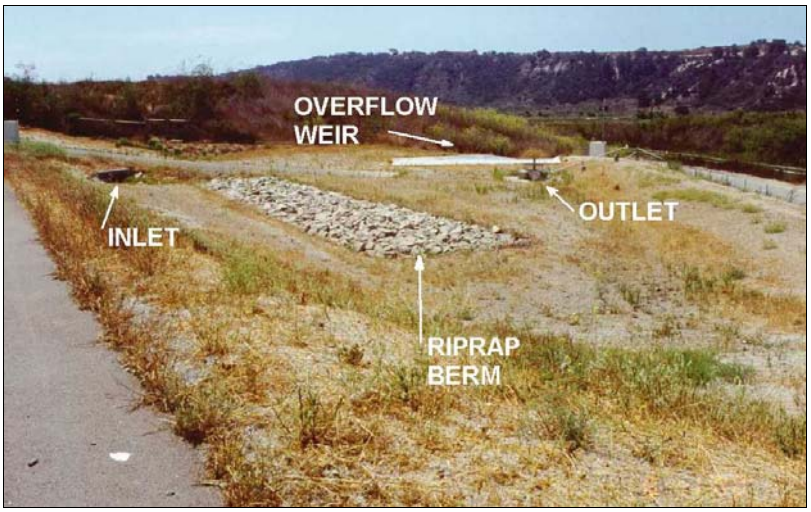

Figure 2-3: Unlined Extended Detention Basin (Caltrans, 2003a)

Table 2-3: Performance of Unlined Extended Detention Basins

Constituent	Mean EMC*		Removal %	Significance P**
	Influent (mg/L)	Effluent (mg/L)		
TSS	137	39	72	< 0.000
TKN	2.24	1.85	17	0.206
Nitrate	1.06	0.98	8	0.529
TN	3.30	2.83	14	NA
TP	0.52	0.32	39	0.001
Total Zinc	0.418	0.115	73	< 0.000
Fecal Coliform (MPN/100mL)	900	2000	-122	0.607

* EMC – Event Mean Concentration
** Significance P – Probability that concentrations are not significantly different

The average removal of TSS for unlined extended detention basins was 72%. Additional removal of TSS occurred as a result of infiltration. Nutrient removal was not very significant.

Advantages of an extended detention basin are design simplicity and cost effectiveness. Basins can capture a substantial amount of toxics that are associated with the TSS and other particulates. However, one of the main limitations of an extended detention basin is ineffectiveness in removing soluble constituents (California Stormwater Quality Association, 2003).

2.3 Wet Basins

Wet basins (Figure 2-4) are designed to intercept a volume of storm water runoff, store the water, and treat the runoff. Wet basins maintain a permanent pool that is displaced in part or completely by the runoff from subsequent storm events. Water quality is improved and the quantity is controlled in properly designed and maintained wet basins. Wet basins also enhance the aesthetic value and aquatic and terrestrial habitat for a variety of plants and animals (Caltrans, 2003a). A schematic of the cross-section of a wet basin is shown in Figure 2-5.

Figure 2-4: An Example of a Wet Basin in California (Caltrans, 2003a)

Removal of constituents in runoff occurs mainly through the gravitational sedimentation of suspended solids and associated constituents. Aquatic plants and microorganisms that develop in the wet basins take up nutrients and degrade organic compounds. However, excessive growth of algae may require frequent algae removal to maintain aesthetic qualities (Barrett, 1999). The performance of a wet basin is shown in Table 2-4 (Caltrans, 2003a).

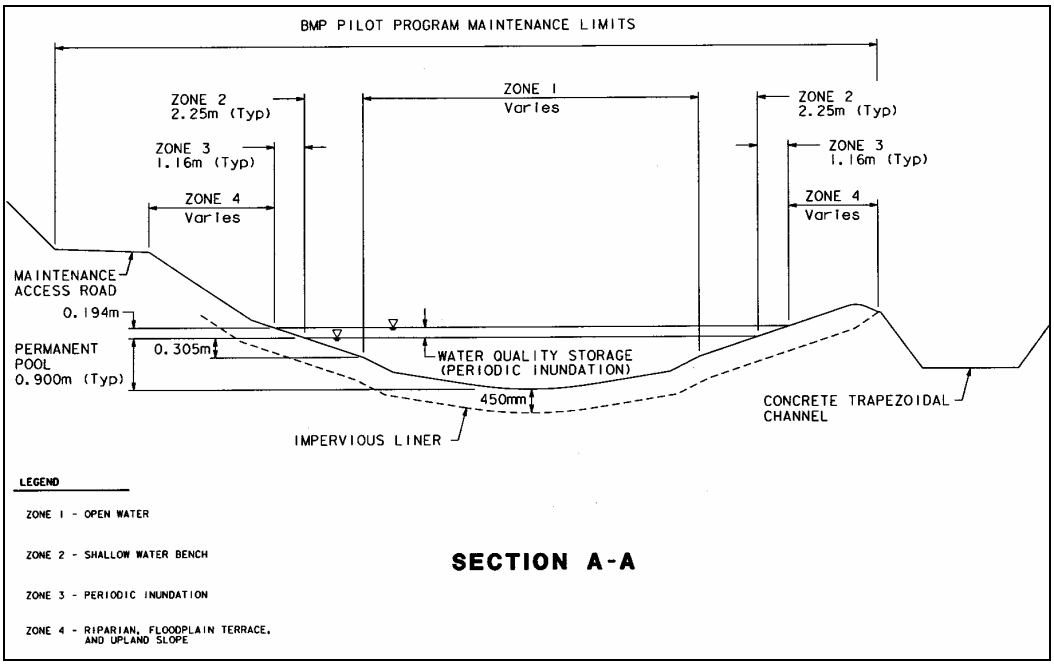

Figure 2-5: Schematic of the Cross-Section of a Wet Basin (Caltrans, 2003a)

Table 2-4: Performance of Wet Basins

Constituent	Mean EMC*		Removal %	Significance P**
	Influent (mg/L)	Effluent (mg/L)		
TSS	210	14	94	< 0.000
TKN	3.01	2.20	27	0.260
Nitrate	2.79	0.65	77	0.029
TN	5.80	2.84	51	NA
TP	0.93	0.88	5	0.773
Total Zinc	0.414	0.037	91	< 0.000
Fecal Coliform (MPN/100mL)	11700	100	99	0.213

* EMC – Event Mean Concentration

** Significance P – Probability that concentrations are not significantly different

Wet basins are best at removing suspended solids and metals from storm water runoff, but are less effective at removing nutrients. The poor performance for total phosphorus removal may be attributed to the presence of relatively high concentrations of phosphorus in the permanent pool before storm events. Most of the nutrient removal in wet basins occurred during dry weather instead of storm events. Uptake of phosphorus by the vegetation in the basin takes place during retention of the runoff in the basin.

It should be noted that during dry weather, nitrate concentrations decreased, TKN concentrations increased; however the concentration of total nitrogen decreased. The reduction in nitrate concentration is most likely caused by plant uptake while the increase in TKN concentrations is a result of plant decay in the water that causes an increase in organic nitrogen in the basin. However, the increase in TKN was relatively small compared to the decrease in nitrate that resulted in an overall decrease in total nitrogen.

2.4 Infiltration Basins

Infiltration basins capture a certain volume of storm water runoff and retain the captured runoff where infiltration into the ground occurs over a period of days (California Stormwater Quality Association, 2003). Excess runoff is bypassed. Some basins are lined with vegetation. Vegetation in the basins can help prevent the migration of pollutants and improve the permeability of the soil. Therefore, the overall efficiency of the basin increases. The main purpose of an infiltration basin is the transformation of the surface water flow into groundwater flow to remove pollutants through filtration, adsorption, and biological processes. Infiltration basins typically are designed to drain within 72 hours to prevent problems like mosquito breeding and odor development. In addition to pollutant removal, infiltration basins also can increase the level of the water table and

baseflow, and reduce the frequency of bank flooding events (Caltrans, 2003a). A schematic of an infiltration basin is shown in Figure 2-6.

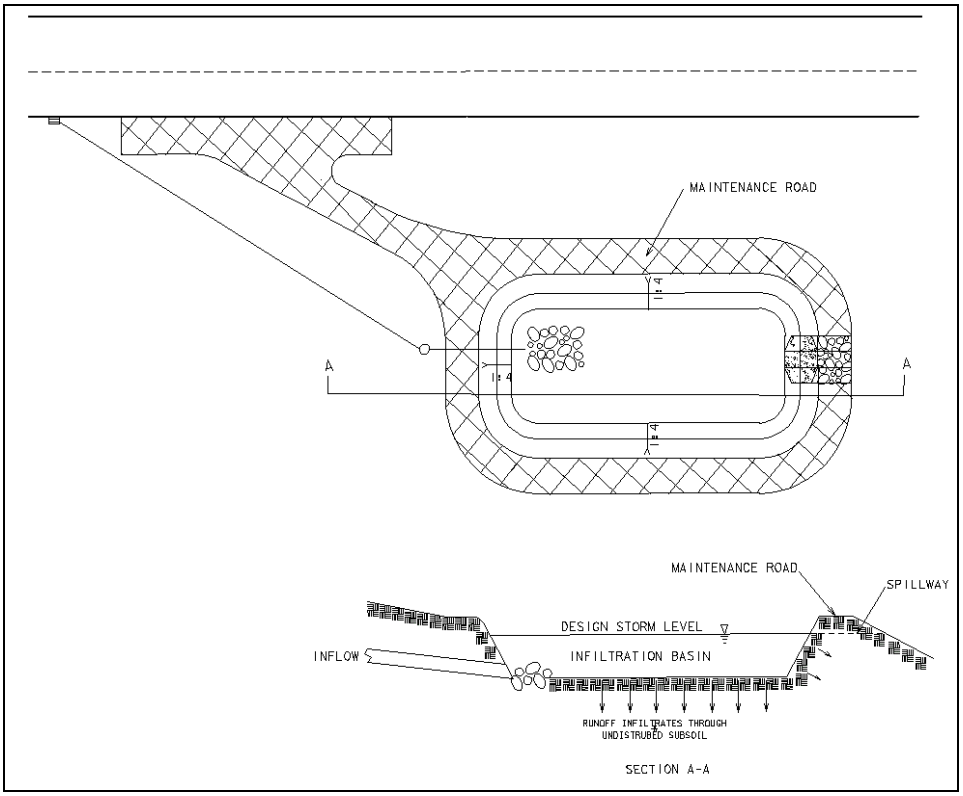

Figure 2-6: Schematic of an Infiltration Basin (Caltrans, 2003a)

The design of infiltration basins is based on infiltration rate, drain time, capture volume, groundwater separation distance, and proximity to adjacent structures. Some other factors that can be considered included basin shape, side slope ratio, maintenance access, vegetation type, inlet configuration, and in-line or off-line configuration. An example of an infiltration basin is shown in Figure 2-7.

Figure 2-7: Infiltration Basin at I-5/La Costa in San Diego, California (Caltrans, 2003a)

The removal of pollutants is considered to be 100% for infiltration systems when the entire volume of runoff infiltrates into the ground and no water is discharged. However, close attention should be paid to the concentrations of pollutants in the groundwater.

2.5 Infiltration Trenches

Infiltration trenches are rock-filled trenches that are designed to allow storm water runoff to infiltrate into the ground. The runoff in the trench infiltrates into the surrounding soil over a period of time. A schematic of an infiltration trench is shown in Figure 2-8. Infiltration trenches typically capture a small amount of runoff and may be designed to capture the first flush of runoff from a storm event. Therefore, trenches frequently are used in conjunction with another BMP such as a detention basin to control peak flows or a vegetated strip to remove floatables and sediment (Caltrans, 2003a).

Infiltration trenches generally remove suspended solids, bacteria, organics, soluble metals, and nutrients. The mechanisms by which these pollutants are removed are filtration, absorption, and microbial degradation. The pollutant removal is considered to be 100 % for storm events that are smaller than the design infiltration volume of the trench. The possibility for groundwater contamination where groundwater is a source of drinking water must be considered.

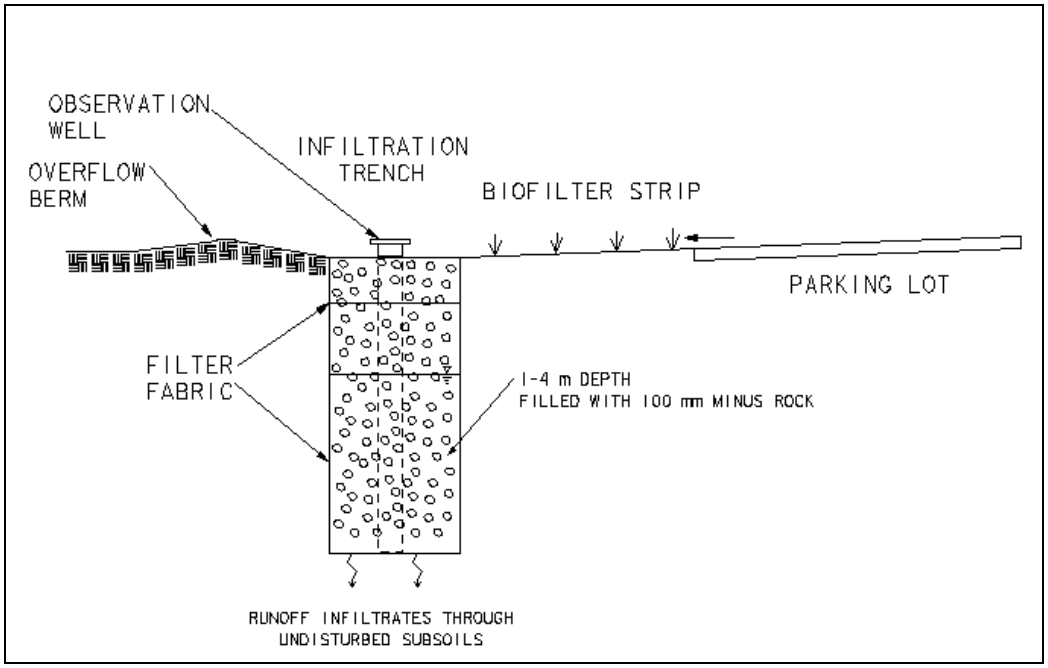

Figure 2-8: Schematic of an Infiltration Trench (Caltrans, 2003a)

2.6 Vegetated Swales

Biofiltration swales or vegetated swales are broad, shallow channels that are lined with dense vegetation on the side slopes and channel bottom to aid in pollutant removal. A typical vegetated swale is shown in Figure 2-9. Swales are designed to convey storm water with an appropriate amount of detention time to

allow for pollutants to be trapped, promote infiltration, and also reduce the velocity of the flow (California Stormwater Quality Association, 2003). An important consideration for the use of vegetative controls like swales is the climate of the area. Irrigation could be necessary to maintain vegetation during dry periods. Swales are versatile and can be used along highways and also at other transportation facilities like parking lots, maintenance yards, rest areas, and truck inspection stations (Caltrans, 2003a).

Figure 2-9: Vegetated Swale (Caltrans, 2003a)

Two types of swales, dry or wet, are used. Dry swales are preferred in areas where standing water is not desired like in residential areas. Wet swales are used in places where standing water does not cause any problems and where the groundwater level is close enough to the surface to maintain the water level during the dry periods. However, mosquito breeding could be a potential problem because of the presence of standing water. The benefit of the wet swale is the

presence of wetland vegetation that can further aid in pollutant removal. High removal of metals but poor removal of phosphorus was observed in vegetated swales. These results are shown in Table 2-5.

Table 2-5: Performance of Swales

Constituent	Mean EMC*		Removal %	Significance P**
	Influent (mg/L)	Effluent (mg/L)		
TSS	94	47	49	0.002
TKN	3.43	2.36	31	0.907
Nitrate	1.22	0.89	27	0.147
TN	4.64	3.24	30	NA
TP	0.26	0.53	-106	0.001
Total Zinc	0.349	0.079	77	< 0.000
Fecal Coliform (MPN/100mL)	12300	16000	-30	0.707

* EMC – Event Mean Concentration
** Significance P – Probability that concentrations are not significantly different

The effluent concentration for phosphorus generally was higher than the influent concentrations in the Caltrans study (Caltrans, 2003a). This phenomenon was considered to be unusual and was attributed to chemical fertilization of the vegetation to establish growth. The results of further work that was done showed that phosphorus was leached from the vegetation during the dormant period. Unfortunately, salt grass, which was the vegetation used, is dormant during the winter, which is the wet season in California. However, the increase in fecal coliform was similar to increases reported in other studies. In general, this type of BMP is not very effective for nutrient removal as can be seen from the results above. The pollutant load reductions observed were mostly caused by infiltration that occurred in the swales.

2.7 Vegetated Buffer Strips

Vegetated buffer strips differ from vegetated swales since runoff occurs as sheet flow instead of conveying the runoff through a channel. Vegetated buffer strips usually are densely vegetated and have a uniformed slope. An example is shown in Figure 2-10. A schematic of a buffer strip also is shown in Figure 2-11. Climate is an important consideration since irrigation might be necessary to establish and maintain vegetation. Vegetated buffer strips can be used as a pretreatment for other BMPs such as infiltration basins and trenches. Vegetated buffer strips also are versatile and have potential use along highways and at other transportation facilities (Barrett, 1999).

Figure 2-10: Buffer Strip along a Highway (Caltrans, 2003a)

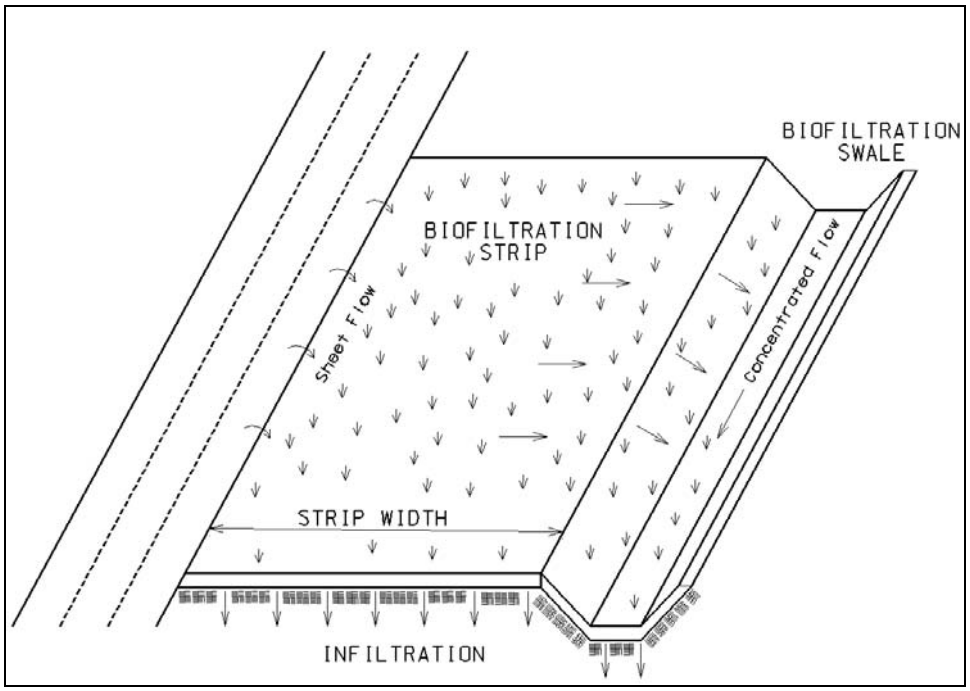

Figure 2-11: Schematic of a Vegetated Buffer Strip (Caltrans, 2003a)

Buffer strips are designed primarily to remove sediments and to allow partial infiltration of runoff, and to reduce the velocity flow of the runoff. Buffer strips also can be used to stabilize drainage channel banks and stream banks when used in combination with riparian buffers. The typical performance of a buffer strip is shown in Table 2-6 (Caltrans, 2003a).

Table 2-6: Performance of Vegetated Buffer Strips (Caltrans, 2003a)

Constituent	Mean EMC*		Removal %	Significance P**
	Influent (mg/L)	Effluent (mg/L)		
TSS	100	31	69	< 0.000
TKN	2.00	2.10	-5	0.542
Nitrate	0.44	0.58	-30	0.367
TN	2.45	2.68	-10	NA
TP	0.42	0.62	-46	0.035
Total Zinc	0.240	0.066	72	< 0.000
Fecal Coliform (MPN/100mL)	17700	1500	92	0.061

* EMC – Event Mean Concentration
** Significance P – Probability that concentrations are not significantly different

These results indicate that there is substantial reduction in TSS and zinc concentrations but only a slight reduction in the nitrogen species and an increase in total phosphorus concentrations.

Vegetated buffer strips can be effective as sedimentation or filtration systems for reduction of constituent concentrations in highway runoff in Austin, TX (Barrett et al., 1998). The performance of the vegetated buffer strips for the two sampling locations in Austin, TX are presented in Table 2-7 and Table 2-8.

Table 2-7: Performance of Vegetated Buffer Strip at U.S. 183 Median (Austin, TX) (Barrett et al., 1998)

Constituent	Mean EMC*		Removal %
	Influent (mg/L)	Effluent (mg/L)	
TSS	157	21	87
TKN	2.17	1.46	33
Nitrate	0.91	0.46	50
TP	0.55	0.31	44
Total Zinc	0.347	0.032	91
Fecal Coliform (CFU/100mL)	96000	280000	-192

* EMC – Event Mean Concentration

Table 2-8: Performance of Vegetated Buffer Strip at Mopac Expressway Median (Austin, TX) (Barrett et al., 1998)

Constituent	Mean EMC*		Removal %
	Influent (mg/L)	Effluent (mg/L)	
TSS	190	29	85
TKN	2.61	1.45	44
Nitrate	1.27	0.97	23
TP	0.24	0.16	34
Total Zinc	0.129	0.032	75
Fecal Coliform (CFU/100mL)	NA	NA	NA

* EMC – Event Mean Concentration

These results show generally good removal of TSS and total zinc and moderate removal for phosphorus and nitrogen. These observations are consistent with the Caltrans study (Caltrans, 2003a).

2.8 BMPs that Address Specific Water Quality Constituents

A matrix was developed after analyzing the available data on performance of the BMPs to show the effectiveness of the BMPs based on the respective removal efficiencies of the constituents. A ranking of “low” is given to BMPs

with a constituent removal efficiency of 0% to 30%, “medium” to BMPs with constituent removal efficiency of 31% to 65%, and “high” to BMPs with constituent removal efficiency greater than 65%. This ranking procedure is applicable to all the discussed constituents except for TSS. A ranking of “low” is given to BMPs with TSS removal efficiency of 0% to 50%, “medium” for removal efficiency of 51% to 75%, and “high” for removal efficiency above 75%. A different ranking procedure was used for TSS because high removal efficiencies for TSS are relatively easy to achieve. The rankings for each BMP for the effectiveness in removing respective constituents are shown in Table 2-9.

Table 2-9: Effectiveness Rankings for Applicable BMPs

	TSS	TKN	Nitrate	TP	Total Zinc	Fecal Coliform
Sand Filters: Austin Sand Filter Delaware Sand Filter	 High High	 Medium Medium	 Low Low	 Medium Medium	 Medium High	 Medium High
Extended Detention Basin	Medium	Low	Low	Medium	High	Low
Wet Basin	High	Low	Medium	Low	High	High
Infiltration Basin	High	High	High	High	High	High
Infiltration Trenches	High	High	High	High	High	High
Vegetated Swales	Low	Medium	Low	Low	High	Low
Vegetated Buffer Strips	Medium	Low	Low	Low	High	Varied

The data presented in Table 2-9 indicate that most of the BMPs analyzed are effective in removing TSS and metals like zinc from storm water runoff but are less effective in removing nutrients and bacteria, which are the most important causes of water quality impairments in Texas. In some cases, export of nutrients was observed. The export of nutrients is most likely due to application of chemical fertilizer for the vegetative controls and nitrification in other BMPs. The reduction in fecal coliform concentrations mostly occurs in wet basins and infiltration systems like the infiltration basin and trenches.

3 METHODOLOGY

This chapter describes the procedures and steps taken to accomplish the objectives of this project. First, a compilation of the highway runoff monitoring data statewide was performed. A GIS geodatabase of impaired water bodies in the state of Texas was developed as a tool to aid TxDOT in visualizing the distribution of impaired streams in the state. A guide for TxDOT on identifying water quality concerns near highway facilities was also developed.

3.1 Compilation of Highway Runoff Monitoring Data

Highway runoff monitoring data was obtained for sampling sites in Austin, Beaumont, Corpus Christi, Dallas, Fort Worth, Houston, and San Antonio. A summary of the number of sites in each city and the time period for which the data were obtained is contained in Table 3-1. The ten sites in Austin included 6 edge-of-pavement sites, 3 vegetative BMPs, and 1 hazardous material trap site. The descriptions of each of the sampling sites are presented in Table 3-2.

Table 3-1: Summary of Monitoring Sites in Texas

City	Number of Sites Monitored	Time Period
Austin	10	9/1993 – 5/2002
Beaumont	2	5/2000 – 9/2001
Corpus Christi	1	9/2000 – 5/2001
Dallas	2	12/1993 – 3/2001
Fort Worth	2	5/1994 – 3/2001
Houston	2	2/1999 – 6/2000
San Antonio	1	10/1999 – 11/2000

Table 3-2: Description for Each Site for Each City

City/Site Name	Site Description
Austin, TX	
35th Street	High traffic site located in central Austin. This site has a tributary area of 5,341 m^2 which is 100% asphalt
Convict Hill	Loop 1 at Convict Hill in South Austin. This site receives runoff from the northbound lanes of Loop 1 at Convict Hill Road
Walnut Creek Road	MoPac Expressway bridge over Walnut Creek in North Austin
Walnut Creek Swale	Loop 1 in North Austin that collects runoff through a grassed swale median from the northbound and southbound lanes of the MoPac Expressway just south of Walnut Creek in Austin.
183 Road	U.S. 183 between Loop 360 and MoPac Expressway which receives runoff directly from curb inlets without passing through vegetated areas
183 Swale	U.S. 183 between Loop 360 and MoPac Expressway which receives runoff through a grassed swale median from the three southbound lanes of U.S. 183
Outfall 001	Loop 1 at W. 35th St. in Central Austin. A storm sewer drain located on the West side of Loop 1 between the access southbound main lanes and the access road in Central Austin
Outfall 004	Grassy swale at Loop 1 flyover in South Austin. This site receives runoff from the northbound lanes of Loop 1
Outfall 005	Industrial Oaks wet pond. A large water quality facility consisting of a hazardous material trap (HMT) and sedimentation/filtration pond that has a tributary area of 64 acres
Outfall 006	FM 967 in Hays County. This rural site is a ditch that receives runoff from FM 967 into Little Bear Creek
Beaumont, TX	
TxDOT 001 Outfall	A manhole located on Hillebrandt Bayou near the IH 10/US 69 Interchange in Beaumont, Jefferson County. The drainage area consists of approximately 35 acres
TxDOT 002 Outfall	Located in north Beaumont, it is a concrete lined channel at 6000 US Hwy 69, 1000 feet north of the intersection of Dowlen Road and US Hwy 69 on the east side of Hwy 69. The drainage area is 165 acres

City/Site Name	Site Description
Corpus Christi, TX	
TxDOT	Description not available
Dallas, TX	
Mountain Creek Outfall	The site drains a portion of I-20 between Spur 408 and Florina Drive. The outfall is a 10-foot wide concrete trapezoidal open channel that discharges into Mountain Creek. The drainage area land use includes highway and vacant land within the right-of-way. The total drainage area is 115.36 acres
Bachman Branch Outfall	The site drains the I-635 and Dallas North Tollway interchange. The outfall is a 54 inch round concrete pipe that discharges into Bachman Creek. The drainage area landuse includes highway and vacant land within the interchange. The total drainage area is 12.05 acres
Fort Worth, TX	
Deer Creek Outfall	The site drains I-35W and some abutting property from just north of Garden Acres to Deer Creek within the Fort Worth city limits. Its drainage area landuse includes both highway and vacant land. The total drainage area is 63.13 acres
Fish Creek Outfall	No site location given. Drainage area is 40.9 acres
Houston, TX	
Loop 610	Manhole on the north bank of Brays Bayou east of the northbound Loop 610 frontage road. Loop 610 station has a catchment area of approximately 19 acres of highway and 2.8 acres of commercial land uses
U.S. 59	Manhole adjacent to the north bank of Keegans Bayou east of the northbound frontage road of the U.S. Highway 59. U.S. 59 station has a tributary approximately 12 acres of highway and 1 acre of commercial land uses
San Antonio, TX	
Leon Creek Outfall	Leon Creek outfall at Ingram Road near SH 151 in San Antonio

The data obtained were entered into a Microsoft Excel spreadsheet. The complete spreadsheet can be found in Appendix B. The data from the spreadsheet were to be made into a more comprehensive Microsoft Access database so that TxDOT would have an idea of the concentrations of different types of constituents in highway runoff, however data from around the state were insufficient and the use of a database to store the data was not justified.

The most important causes of impairment of water quality in streams in Texas are depressed dissolved oxygen levels, high concentrations of bacteria, total dissolved solids (TDS), mercury, nitrate, phosphorus, lead, zinc, chloride, and sulfate. The concentrations of these constituents, as well as some additional constituents for these cities are reported in the spreadsheet. A list of constituents is shown in Table 3-3. There are other parameters of concern including PCBs, dioxins, pesticides, and priority organics but insufficient data from highways in the state were available. Therefore, these numbers are not reported and included in the spreadsheet.

Table 3-3: List of Constituents Measured

Constituents Measured
Water Temperature
pH
Biochemical Oxygen Demand (BOD)
Chemical Oxygen Demand (COD)
Fecal Coliform
Fecal Streptococcus
Total Suspended Solids (TSS)
Total Dissolved Solids (TDS)
Total Kjeldahl Nitrogen (TKN)
Total Nitrate
Ammonia
Nitrite
Total Nitrogen (TN)

Constituents Measured
Total Phosphorus (TP)
Dissolved Phosphorus (DP)
Mercury
Lead
Zinc
Copper
Cadmium
Selenium
Chloride
Sulfate

Information about the sampling location and storm event when the water samples were taken to measure the above constituents was given for some of the sites and reported in the spreadsheet. This information includes the date the sample was taken, size of the drainage area, amount and duration of the rainfall, runoff volume, flow, intensity, and antecedent rain. The information is summarized in Table 3-4. This information is very limited because the data were not available from many of the sites.

Table 3-4: List of Information about Sampling Locations and Rain Events

Information about Sampling Location and Rain Event
Date Sample was Taken
Size of Drainage Area
Rain in inches
Duration
Rainfall Volume
Runoff Volume
Flow
Intensity
Antecedent Rain

An analysis was done on existing BMPs like grassed swales and vegetated strips using existing data in Texas and California. Three grassed swale sites in Austin, TX (Walnut Creek, 183, and Outfall 004) and four sampling sites in California (Highway 299, Sacramento, San Rafael, and Cottonwood) were analyzed for the purpose of this project. The data were assumed to be log-normally distributed and the mean *(μ)* and variance *(s^2)* of the log transformed EMCs were calculated as:

$$\mu = \frac{\sum x}{n}$$

$$s^2 = \frac{\left(n\sum x^2 - \left(\sum x\right)^2\right)}{n(n-1)}$$

where: x is the natural log of EMCs.

Σx represents the summation of data points (x).

n is the number of data points (x).

The mean of the EMCs (a) was calculated as:

$$a = e^{(\mu + s^2/2)}$$

The quality of the water flowing from the grassed strips from these sites was analyzed using log normal probability plots that were developed in a statistical program (Minitab Inc., 2000). These plots show the distribution of concentrations of the constituent for the different sites in Texas. The constituents that were analyzed include TSS, TP, TKN, nitrate, TN, and zinc. In most cases, TN was the sum of nitrate and TKN because the nitrite normally is present in very small concentrations. The edge of pavement data and swale effluent data were compared using log normal probability plots to identify any significant difference in the water quality.

3.2 Development of a GIS Geodatabase of Impaired Water Bodies in Texas

An ArcGIS geodatabase was developed to represent the impaired streams that are listed in the Section 303(d) list for the state of Texas. To perform this task, the first step was to obtain all relevant maps in GIS format. These GIS maps are in the form of shapefiles. The important shapefiles that were downloaded include county boundaries, subwatersheds or hydrologic unit codes (HUCs), streams and lakes, and state highways and roads for the state of Texas. These shapefiles were obtained from different sources. The sources for each of the different GIS maps and for the Section 303(d) list of impaired streams are as follows:

Water bodies shapefile
http://www.tnrcc.state.tx.us/gis/hydro.html

Subwatersheds or HUCs and Texas counties shapefiles
http://www.twdb.state.tx.us/mapping/gisdata.htm

Texas roads and highways shapefile
http://www.tnris.state.tx.us/DigitalData/data_cat.htm#Transportation

One of the preliminary steps in developing the geodatabase was creating a table that contained the water bodies on the Section 303(d) list. An example of information that is available in the 303(d) list is illustrated in Figure 3-1. This list is the Draft 2002 Texas 303(d) List developed by the TCEQ. The complete 303(d) list is in Appendix A.

SegID: **0101A Dixon Creek (unclassified water body)** Overall Category: **5b**

Water body location: From confluence of the Canadian River to the upstream perennial portion of the stream east of Borger in Hutchinson County

Area	Parameter	Category	Rank
Entire water body	Bacteria	5c	D
Entire water body	depressed oxygen levels	5b	S

Figure 3-1: Sample of Information Contained in the 303(d) List

The Segment ID is a unique identification number given by TCEQ to each water body segment. Segment IDs consisting of numbers are given to classified water bodies while Segment IDs with a letter following the numbers are given to unclassified water bodies. Unclassified water bodies are tributaries to larger water bodies and are generally smaller in size. The exact location of the water body is given in the 303(d) list, including the segments of the water body that are impaired and the constituent of concern. The definitions for the category and rank are as follows:

Category 5a – a TMDL is underway, scheduled, or will be scheduled

Category 5b – a review of the water quality standards for this water body will be conducted before a TMDL is scheduled

Category 5c – additional data and information will be collected before a TMDL is scheduled

Rank H – urgency to initiate TMDL is high

Rank M – urgency to initiate TMDL is medium

Rank L – urgency to initiate TMDL is low

Rank S – standards will be reviewed before a TMDL is scheduled

Rank D – additional data will be collected before a TMDL is scheduled

A table of the impaired water bodies in the 303(d) list was first created in Microsoft Excel and converted into a .dbf file that is compatible with ArcGIS. The table was set up in a way that a ranking from "1" to "5" is entered under that constituent column if a water body is impaired by that particular constituent. A ranking of "0" is entered into the column if the water body is not impaired. A summary of the definitions of the rankings are shown in Table 3-5.

Table 3-5: Summary of Definitions of Rankings in 303(d) List

Rank	Definition
0	Not impaired
1	Impaired; TMDL is underway, scheduled, or will be scheduled; high priority
2	Impaired; TMDL is underway, scheduled, or will be scheduled, medium priority
3	Impaired; TMDL is underway, scheduled, or will be scheduled; low priority
4	Impaired; water quality standards need to be reviewed before a TMDL is scheduled
5	Impaired; additional data and information will be collected before a TMDL is scheduled

The data in the .dbf table are joined (Figure 3-2) with the impaired water bodies shapefile in ArcMap (a map creation program contained in ArcGIS). The common field to relate the 303(d) list table to the impaired water bodies shapefile is the SEG_ID field.

The reason for joining the table to the shapefile was to enable the query of impaired water bodies by constituent. For example, if a distribution of water bodies that are impaired by pathogens with a TMDL scheduling urgency of medium is desired, a "2" is entered in the query dialog box in ArcMap (Figure 3-3).

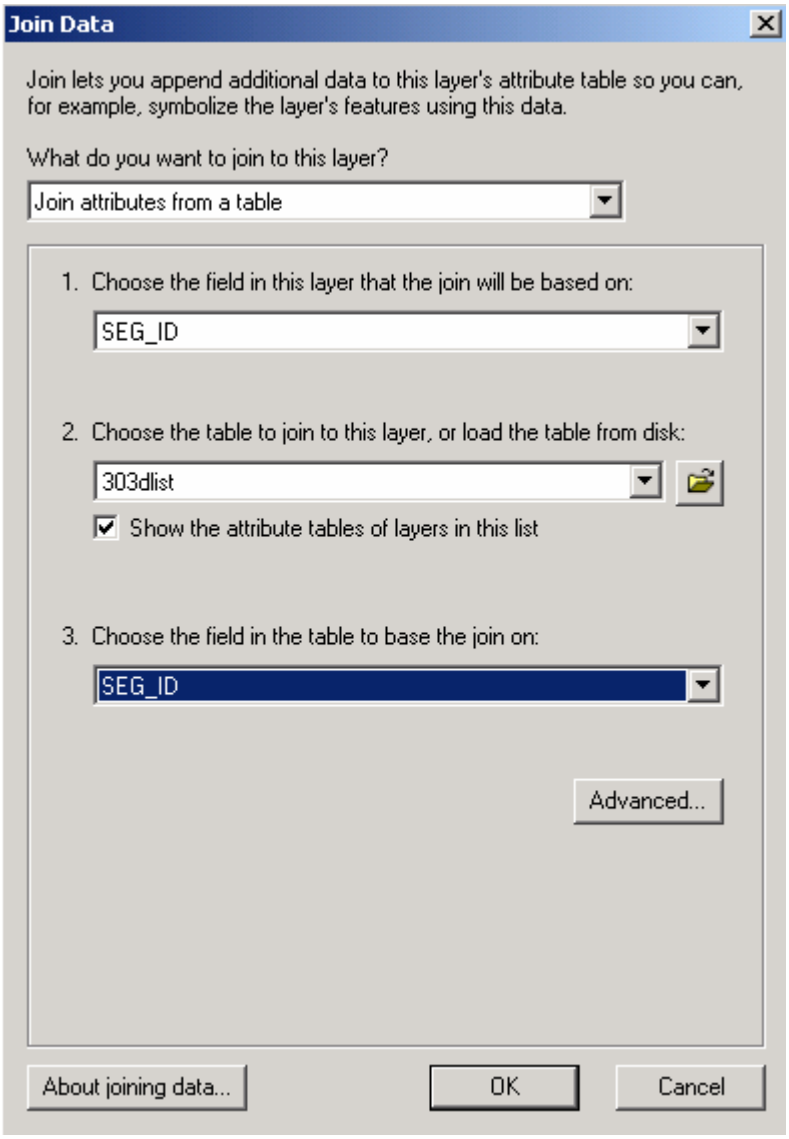

Figure 3-2: Dialog Box for Joining Tables with Shapefile

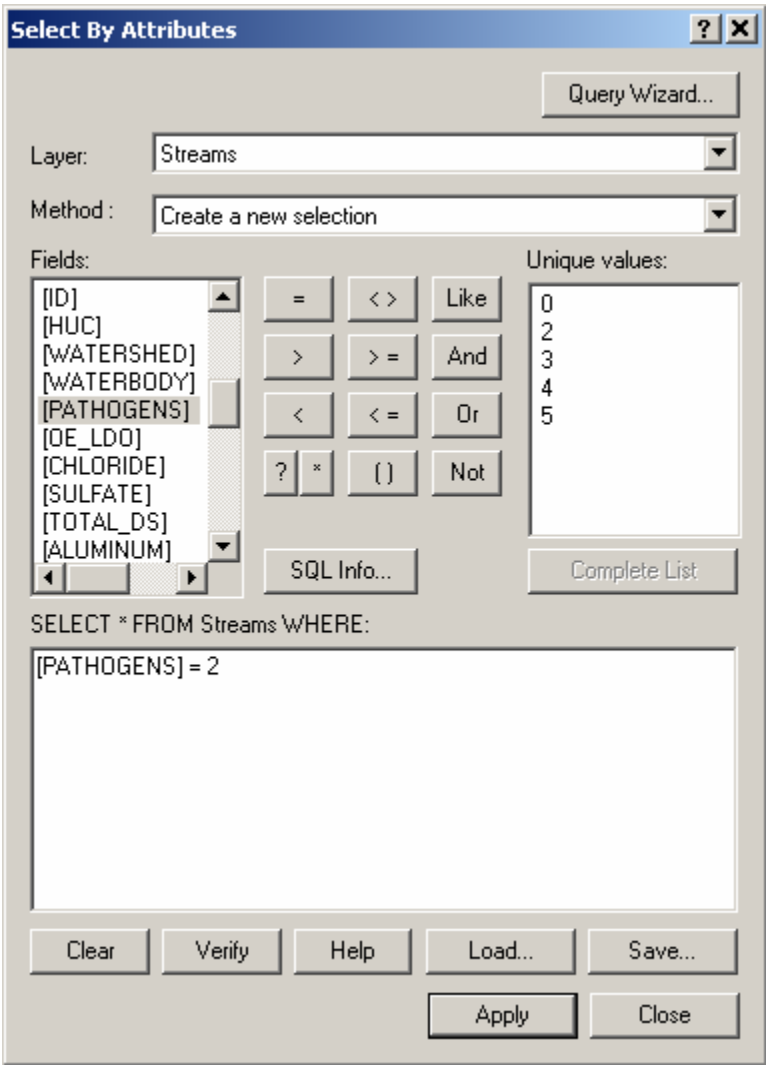

Figure 3-3: Dialog Box for Querying ArcMap

A basemap was created in ArcMap using all the GIS shapefiles that were previously obtained (Figure 3-4). The counties layer is not shown on the map. The highways shapefile is too dense to be shown in the figure.

Figure 3-4: Original ArcMap basemap

The projection that was used for the shapefiles in ArcMap is consistent with that used by TxDOT for developing maps. This projection is called the Shackelford Projection. A summary of the characteristics of the Shackelford Projection is shown in Table 3-6.

Table 3-6: Characteristics of the Shackelford Projection

SHACKELFORD PROJECTION	
Projection	Lambert Conformal Conic
Spheroid	Clarke 1866
Datum	North American Datum of 1927 (NAD27)
Longitude of Origin	100 Degrees West (-100)
Latitude of Origin	31 Degrees 10 Minutes North
Standard Parallel #1	27 Degrees 25 Minutes North
Standard Parallel #2	34 Degrees 55 Minutes North
False Easting	3,000,000 Feet
False Northing	3,000,000 Feet
Units of Measure	Feet

Many of the unclassified streams from the 303(d) list were not shown on the GIS map of water bodies in Texas that was obtained from TCEQ. Therefore, a more detailed map of water bodies was needed. This problem was solved by downloading the National Hydrography Dataset (NHD) for Region 12. The NHD is a "comprehensive set of digital spatial data that contains information about surface water features" (U.S. Geological Survey, 2003). Most of the streams in Texas are located within water resources Region 12. A few of the water bodies in Texas also are located within Regions 11 and 13. However, the NHD for these two regions were not needed because none of the required unclassified water bodies were in these two regions. The subwatersheds in the NHD website can be downloaded individually. This method of obtaining the data is very time consuming. Therefore, the NHD for the entire Region 12 was obtained from Dr. David Maidment who is currently Director of the Center for Research in Water Resources (CRWR) at the University of Texas at Austin. The obtained NHD for Region 12 is shown in green in Figure 3-5.

Figure 3-5: Basemap with overlaid NHD Shapefile

A portion of Harris County where Houston is located is shown in Figure 3-6. The difference between the NHD (in green) and the original shapefile (in blue) is apparent.

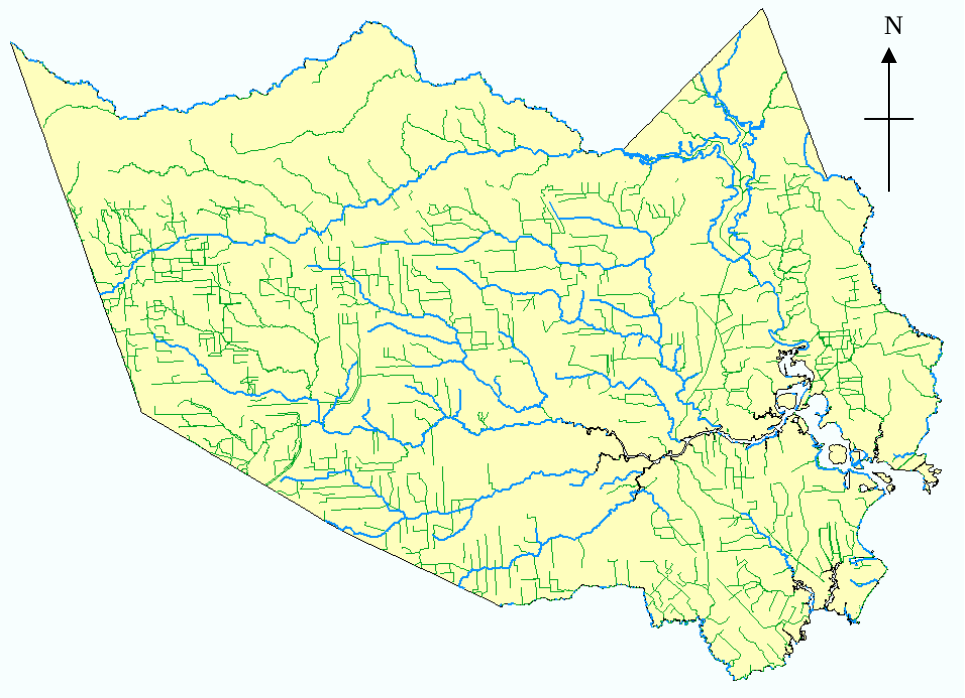

Figure 3-6: Zoomed-In portion of Basemap showing Harris County

The Region 12 NHD and the GIS shapefile of water bodies shared a common field, which was the name of the water body. The unclassified water bodies that were missing from the water bodies shapefile but were named in the NHD were located and extracted as individual shapefiles. Extraction of the individual shapfile involved selection of the line or segment in ArcMap and exporting the data as a separate layer. For example, Berry Bayou Above Tidal (Segment 1007F) is an unclassified water body that was not found in the original shapefile but can be found in the NHD. Therefore, this segment was selected in the NHD and exported as a separate shapefile (Figure 3-7).

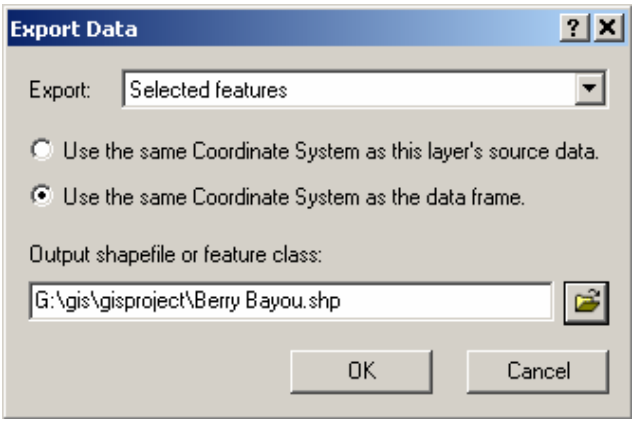

Figure 3-7: Dialog Box for Extracting Features from a Basemap

The missing unclassified water body was extracted as a separate layer in ArcMap and the individual shapefile was merged with the original shapefile using the Geoprocessing Wizard tool in ArcMap (Figure 3-8). The shapefile **seg_line** is the original water bodies shapefile obtained from TCEQ.

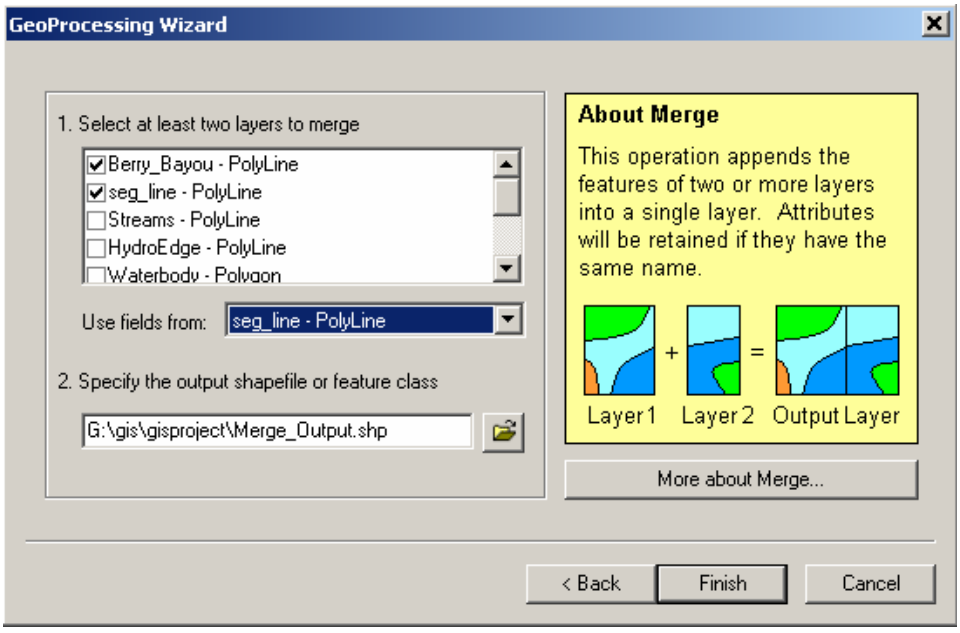

Figure 3-8: Dialog Box for Merging Shapefiles using the Geoprocessing Wizard Tool in ArcMap

The NHD and the water bodies shapefile do not have any common fields except for the name field. All fields except for the name field had to be entered into the water bodies shapefile attribute table after merging the NHD extracted shapefile with the water bodies shapefile. The empty records after the Berry Bayou shapefile was merged with the **seg_line** file are illustrated in Figure 3-9 .

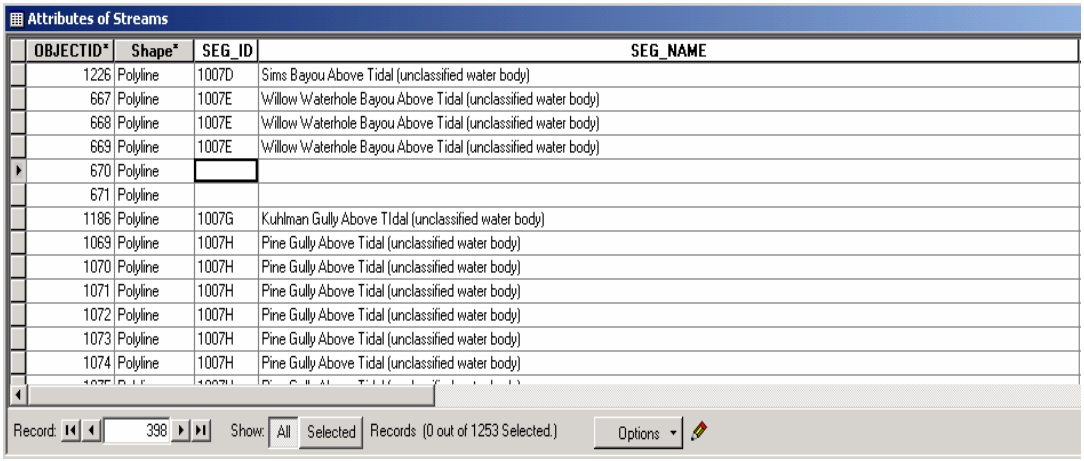

Figure 3-9: Attribute Table showing Empty Records for the New Feature after Merging the Shapefiles

Not all the water bodies in the Region 12 NHD were named, i.e. some of the water bodies had a blank record under the name field. Therefore, the missing unclassified water bodies that were not named in the NHD had to be manually located on the map. The steps for extracting and merging the shapefiles were the same as above after locating the water body.

Some of the even smaller unclassified water bodies were not found on the NHD. Many of these missing unclassified water bodies were located in Harris and Galveston counties. Individual shapefiles for Harris, Galveston, and Travis county water bodies were downloaded to solve this problem. These individual shapefiles were denser than the NHD for the respective counties. Most of the missing

unclassified water bodies for those counties were found in the individual county shapefiles. These water body segments were extracted and merged with the original shapefile using the same steps as before. A portion of Harris County is shown in Figure 3-10. The difference between the original shapefile (in blue) and missing streams that were extracted from the NHD and the individual county shapefiles (in red) can be seen.

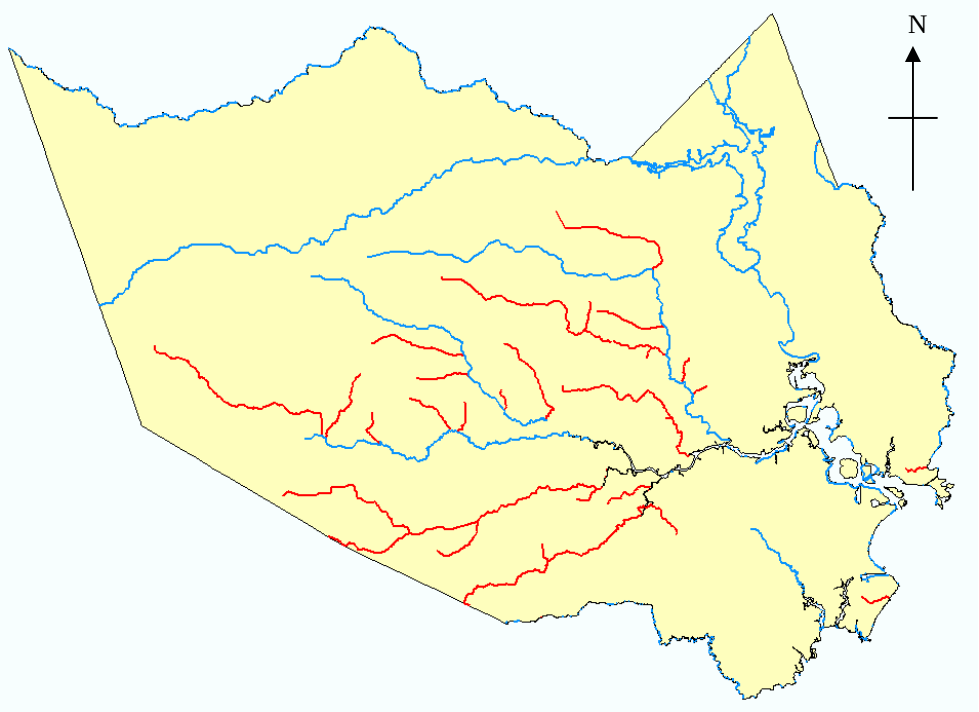

Figure 3-10: Zoomed-In Portion of Basemap showing Harris County with the Difference between the New and Original Shapefiles for Impaired Segments

A geodatabase was created in ArcCatalog to consolidate the obtained data after all the missing water bodies were located and merged with the original shapefile and all the relevant shapefiles were obtained (Figure 3-11).

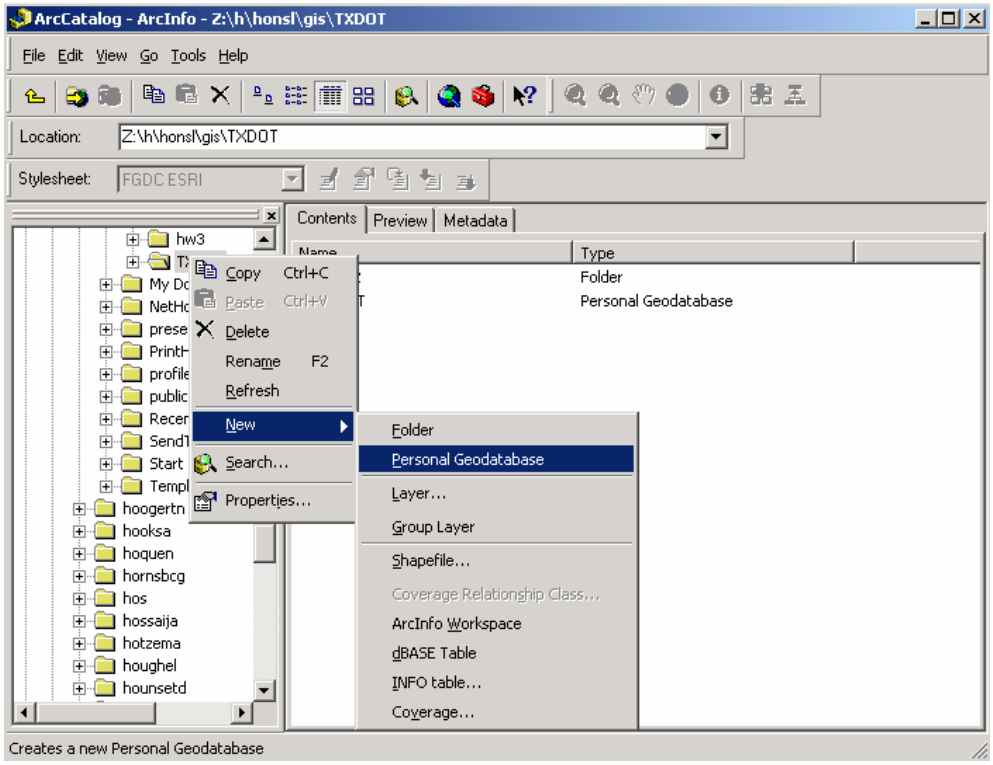

Figure 3-11: Dialog Box for Creating a new Geodatabase

ArcCatalog is a user interface in ArcGIS that allows a user to create, modify, and refine the structure of a geodatabase. The shapefiles are imported into the new geodatabase after creating an empty geodatabase (Figure 3-12).

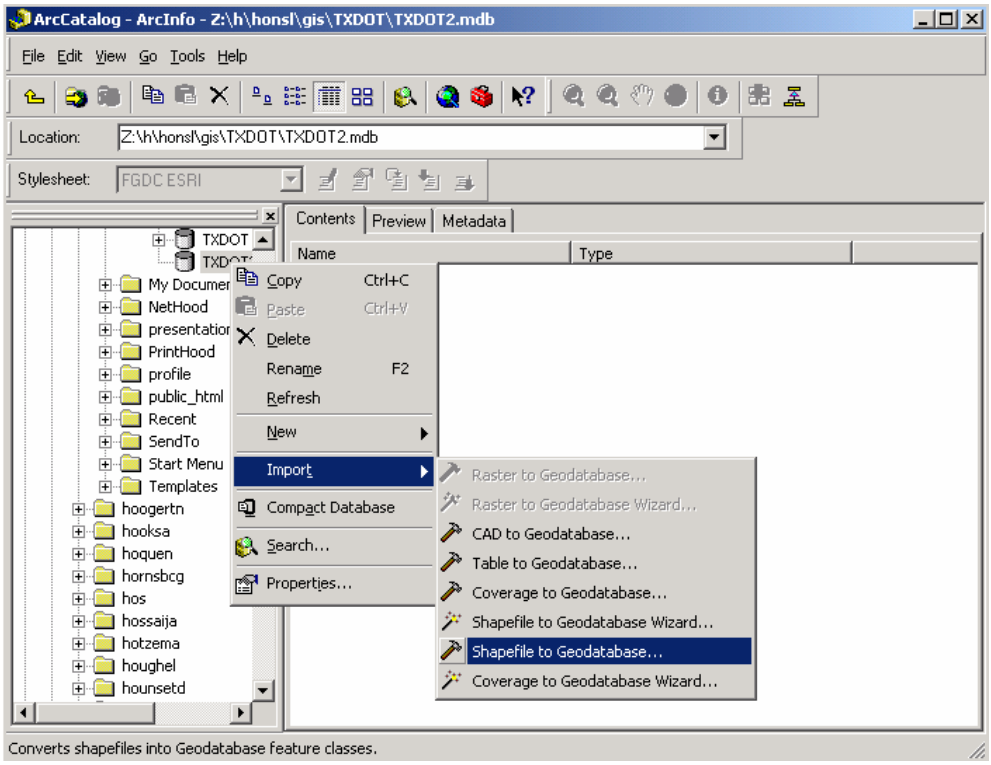

Figure 3-12: Dialog Box for Importing Shapefiles into a Geodatabase

3.3 Summarized Guide for Identifying Water Quality Concerns near Existing Highway Facilities

Summary guidelines for identifying water quality issues in Texas include:

1. Determine location where highway facility is to be constructed.
2. Perform query on the developed GIS coverage of impaired streams by selecting “Impaired = Yes” in the query dialog box to determine if the location where highway facility is to be constructed is of concern with regards to the water quality of receiving streams in the area.
3. If area is of concern, query the coverage to determine what type of impairment is present.

4. Determine relevant BMP for the type of impairment that is present and include in project design.
5. Construct highway facility.

Guidelines for building a new geodatabase of the impaired stream coverage, if the shapefiles and the 303(d) list become outdated or obsolete are:

1. Obtain relevant shapefiles from the websites given in the previous section.
2. Obtain the most updated Section 303(d) List of Impaired Water Bodies in Texas from TCEQ.
3. Enter the data from the 303(d) list into a spreadsheet to be joined with the water bodies shapefile in ArcMap.
4. Check that all the water bodies in the 303(d) list are also available in the obtained shapefiles. If not, follow the method for extracting and merging shapefiles given in the previous section.
5. Create a new geodatabase in ArcCatalog with the relevant and complete shapefiles using the method shown in the previous section.
6. Determine location of interest.
7. Query impaired water bodies coverage on ArcMap to check if there is a concern with water body impairments in the area. If yes, query for type of impairment and implement relevant BMP before constructing new highway facility. If not, then proceed with construction of facility.

4 RESULTS AND DISCUSSION

This chapter discusses the results and analyses of this project and includes the analysis of the compiled highway water quality monitoring data of TxDOT facilities, the distribution of streams impaired by specific pollutants, and the results from the assessment performed on currently-installed BMPs.

4.1 Analysis of Compiled Highway Water Quality Monitoring Data

A statistical analysis was performed on the water quality data from Texas monitoring sites. Water quality data were obtained from sites in Austin, Dallas/Fort Worth, Beaumont, Corpus Christi, Houston, and San Antonio.

An analysis of variance (ANOVA) was performed on the data obtained. This analysis was used to determine if the concentrations of total suspended solids (TSS), total dissolved solids (TDS), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), fecal coliform (FC), total phosphorus (TP), Total Kjeldahl Nitrogen (TKN), lead, and zinc at the monitoring sites for individual cities were significantly different. These constituents were of most concern with respect to the water quality in Texas according to the EPA Section 303 (d) list. Depressed oxygen concentrations and bacteria are the most common causes of impairments in water bodies in Texas. BOD, COD, TP, and TKN are generally associated with low dissolved oxygen concentrations in water bodies while FC is an indicator of the possible presence of pathogens in water bodies. TSS was analyzed because TSS is an important constituent of highway runoff. Zinc and lead were analyzed because these metals represent an important component of total metals in highway runoff. However, this analysis was not performed on the data from Corpus Christi and San Antonio because only one monitoring site is located in each city. The probability (P) that the concentrations

in each site for each city are not significantly different was calculated by MiniTab. The results are based on a 90% confidence interval. A probability of less than 0.10 indicates that the mean concentrations at each site are significantly different at a 90% confidence interval. The probabilities calculated by MiniTab and the summary of the results are shown in Table 4-1 and Table 4-2, respectively. Only the edge of pavement data was used in this analysis in Austin, TX instead of both the edge of pavement and swale data. Concentrations in the swale effluent were lower than the edge of pavement data.

Table 4-1: Probability that the Concentrations at Different Monitoring Sites are Not Significantly Different

City	Probability									
	TSS	TDS	BOD	COD	FC	TP	TKN	TN	Lead	Zinc
Austin	0.04	0.04	0.00	0.00	0.26	0.00	0.05	0.01	0.00	0.00
Beaumont	0.43	0.10	0.73	0.25	0.30	0.65	0.72	0.39	0.44	0.55
Dallas/Ft. Worth	0.08	0.00	0.12	0.13	0.04	0.02	0.02	0.07	0.03	0.03
Houston	0.34	0.14	0.17	0.22	0.14	0.07	0.12	0.50	0.25	0.17

Table 4-2: Summary of Results of ANOVA

City	TSS	TDS	BOD	COD	FC	TP	TKN	TN	Lead	Zinc
Austin	SD	SD	SD	SD	NSD	SD	SD	SD	SD	SD
Beaumont	NSD	NSD	NSD	NSD	NSD	NSD	NSD	NSD	NSD	NSD
Dallas/Ft. Worth	SD	SD	NSD	NSD	SD	SD	SD	SD	SD	SD
Houston	NSD	NSD	NSD	NSD	NSD	SD	NSD	NSD	NSD	NSD

Note: NSD – Not Significantly Different
SD – Significantly Different

The concentrations of constituents for the 10 monitoring sites in Austin, TX were significantly different except for fecal coliform. The water quality data for TDS, FC, and BOD were limited in terms of number of data points. TDS data were available for only 7 out of 10 sites in Austin, TX. The sites that did not have available data include 183 Road, 183 Swale, and Walnut Creek Road. The

concentrations of the constituents of interest for the 2 monitoring sites in Beaumont were found to be not significantly different. There was no significant difference in concentrations of the constituents of interest in the two monitoring sites in Houston, except for TP. Water quality data from the four monitoring sites in the Dallas/Ft. Worth area were significantly different, except for BOD and COD.

The concentration of each of the constituents for the city is averaged if the constituent concentrations are found to be not significantly different for the different monitoring sites within each city. The average concentrations for each of the cities were reported individually if the concentrations of the constituents were found to be significantly different. These averages, including data for Corpus Christi and San Antonio are reported in Table 4-3. Log-normal cumulative distribution plots that correspond to the data are presented in Figure 4-1, Figure 4-2, Figure 4-3, Figure 4-4, Figure 4-5, Figure 4-6, Figure 4-7, Figure 4-8, and Figure 4-9.

Table 4-3: Summary of Average Concentrations

City	TSS (mg/L)	TDS (mg/L)	BOD (mg/L)	COD (mg/L)	FC (CFU/100mL)	TP (mg/L)	TKN (mg/L)	TN (mg/L)	Zinc (μg/L)
Austin					89518				
35th Street	191.5	NA	17.4	154.1		0.43	NA	4.1	237.6
Convict Hill	167.1	130.1	5.5	48.1		0.14	1.1	1.6	67.0
Walnut Creek	176.1	NA	7.6	93.7		0.23	2.6	4.4	123.4
U.S. 183	186.1	NA	NA	96.4		0.55	2.3	3.8	584.3
Outfall 001	71.8	140.7	5.3	88.0		0.15	1.8	2.4	171.1
Outfall 006	18.5	197.9	2.3	57.5		0.16	1.6	1.7	17.5
Beaumont	34.6	143.1	7.1	71.5	76403	0.30	0.83	1.3	135.9
Corpus Christi	82.4	217.5	13.2	248.0	91542	0.58	2.2	2.9	183.3
Dallas/Ft. Worth			6.9	55.0					
Deer Creek	133.6	177.6			54877	0.22	1.3	1.9	69.9
Mountain Creek	267.9	510.6			50877	0.74	3.8	3.8	179.6
Fish Creek	84.8	123.3			279895	0.41	1.1	2.1	43.6
Bachman Branch	99.7	191.1			905129	0.26	2.2	3.3	142.4
Houston	311.1	317.8	15.1	109.9	171523		2.5	3.8	204.9
Loop 610						0.45			
U.S. 59						0.25			
San Antonio	199.65	28.83	5.27	31.82	11171	0.31	1.37	NA	90.17

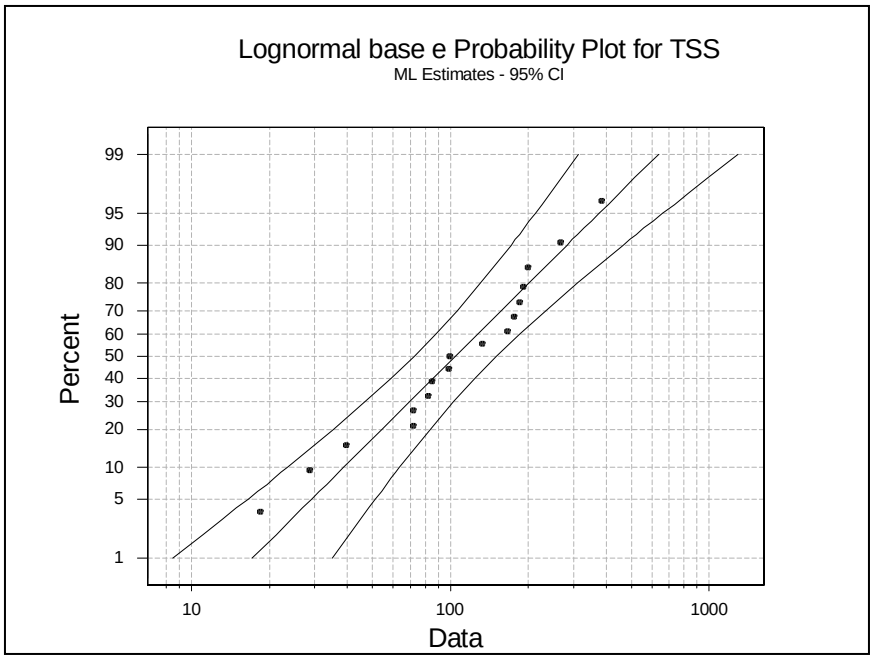

Figure 4-1: Probability Plot for Total Suspended Solids (mg/L)

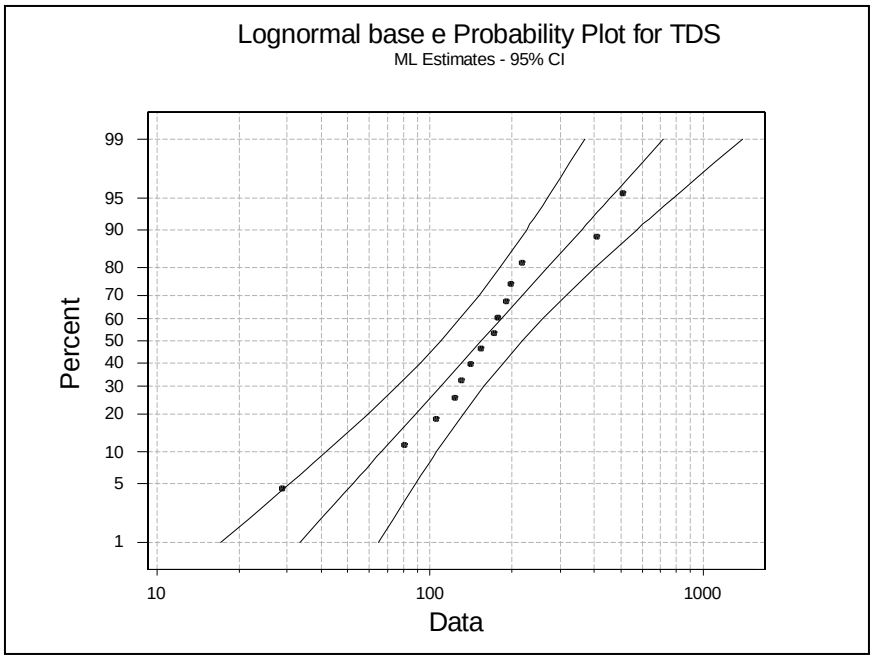

Figure 4-2: Probability Plot for Total Dissolved Solids (mg/L)

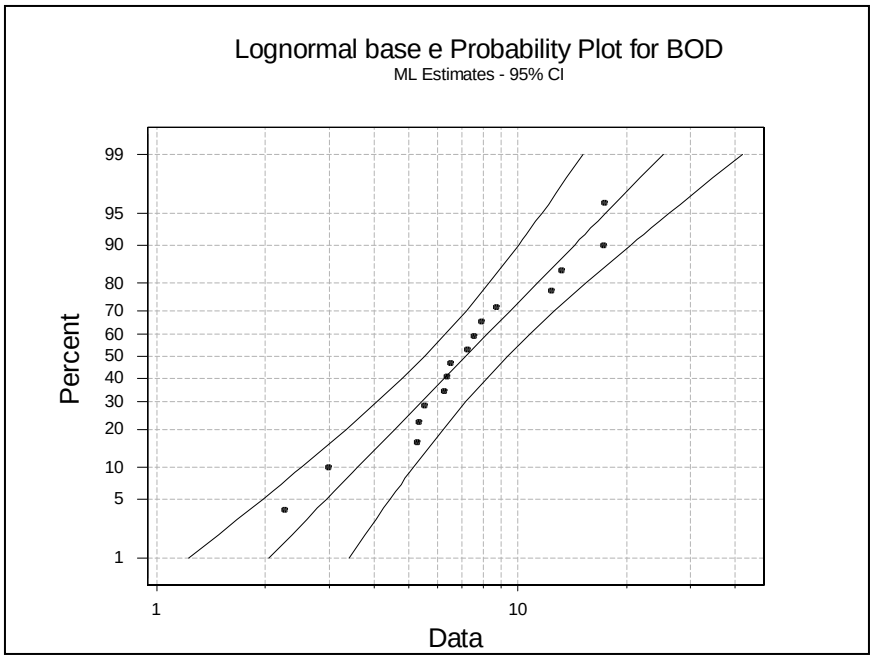

Figure 4-3: Probability Plot for Biochemical Oxygen Demand (mg/L)

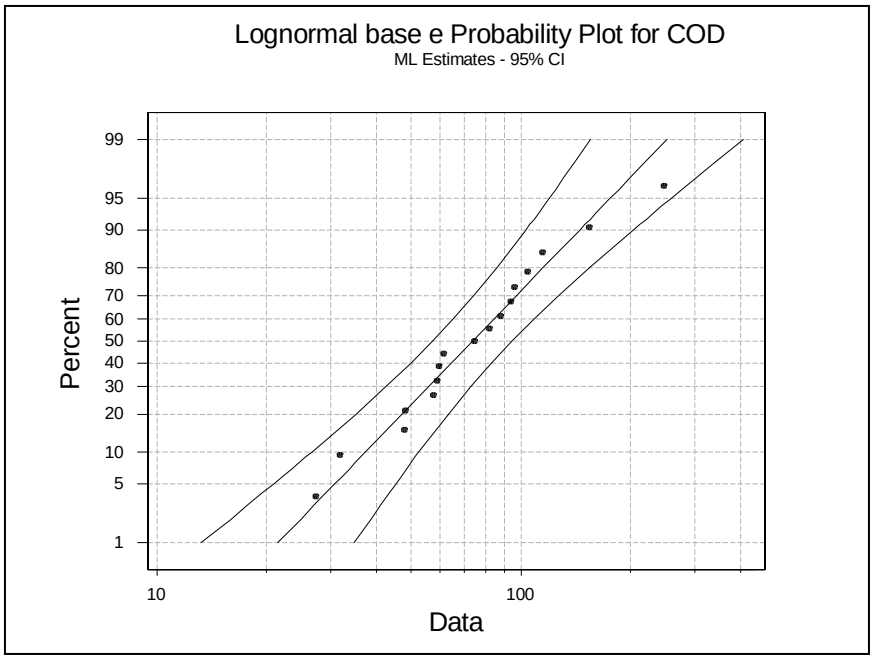

Figure 4-4: Probability Plot for Chemical Oxygen Demand (mg/L)

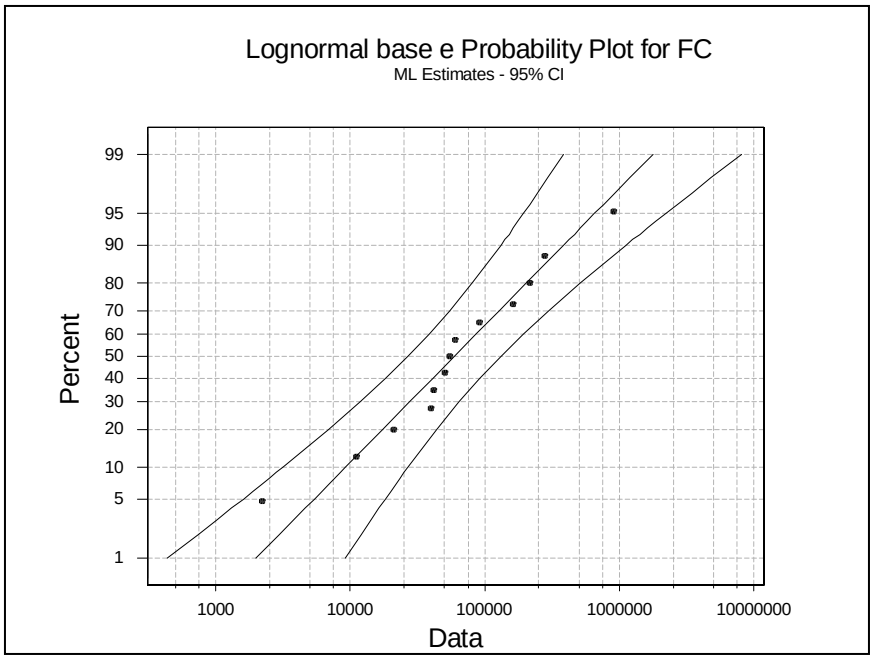

Figure 4-5: Probability Plot for Fecal Coliform (CFU/100mL)

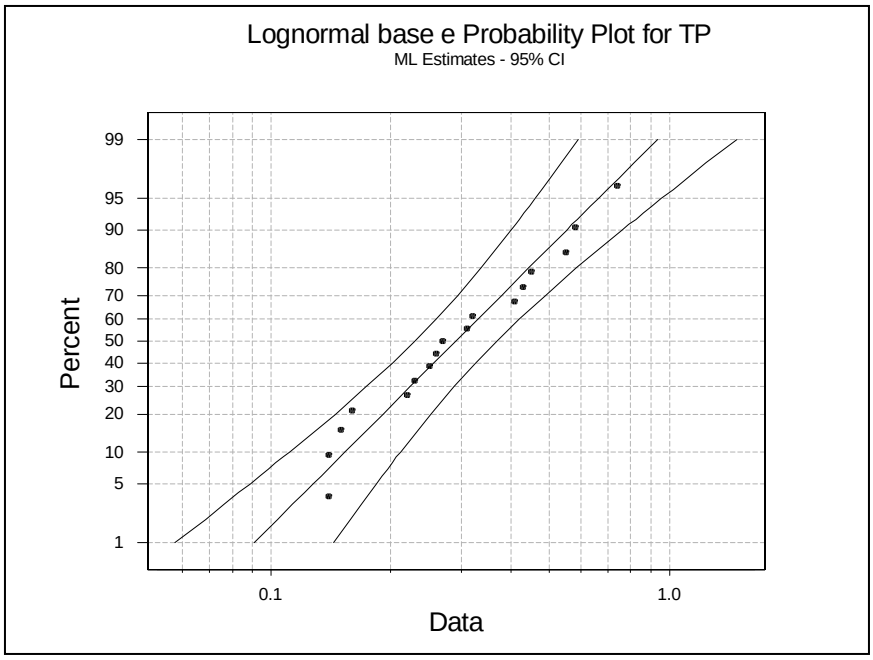

Figure 4-6: Probability Plot for Total Phosphorus (mg/L)

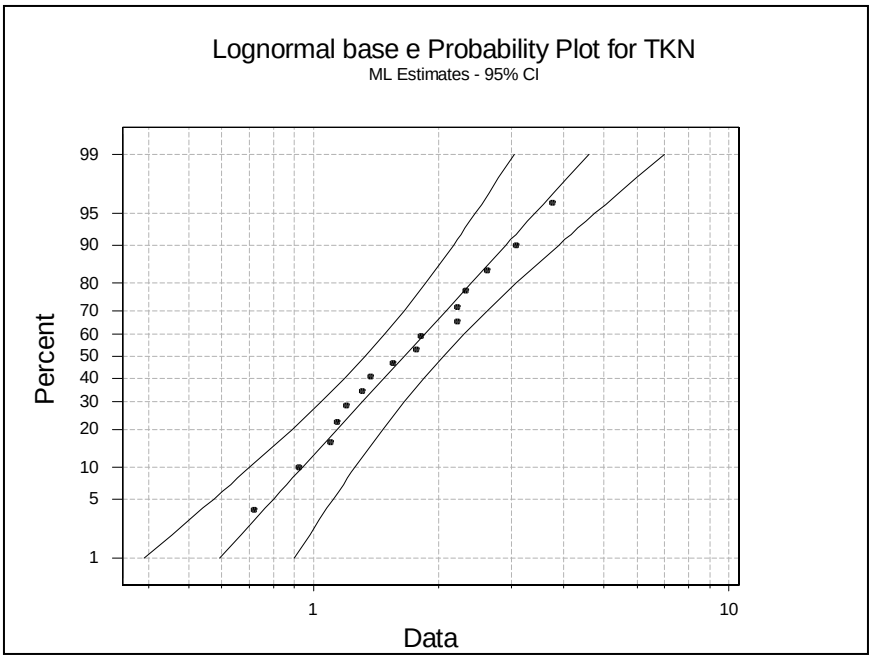

Figure 4-7: Probability Plot for Total Kjeldahl Nitrogen (mg/L)

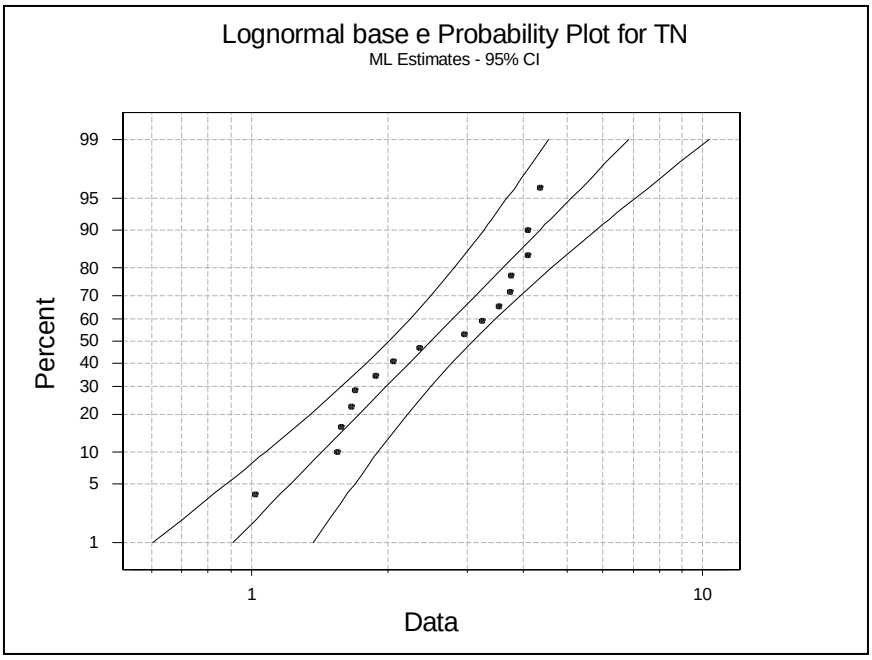

Figure 4-8: Probability Plot for Total Nitrogen (mg/L)

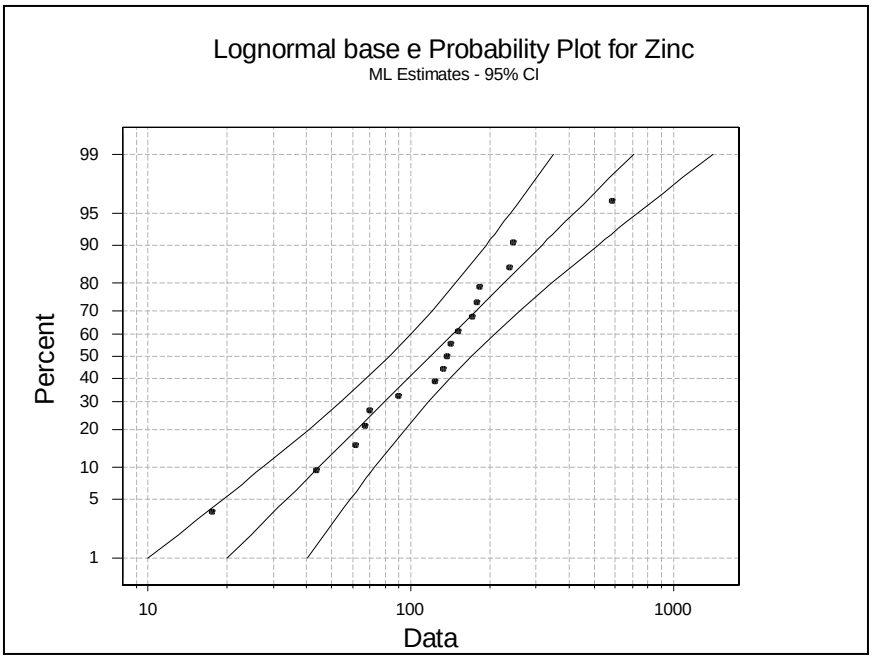

Figure 4-9: Probability Plot for Zinc (μg/L)

The concentrations of TSS for Houston and San Antonio are high compared to the median EMC of 142 mg/L for urban highways (U.S. Department of Transportation, 1990). Houston reported the highest TSS concentration of 311.1 mg/L. However, the average TSS concentrations all exceeded the TSS concentration expected in runoff from undisturbed land of 80 mg/L (Barrett, 1999), except for Beaumont and two of the sites in Austin. The COD concentration for all the cities, except Austin and Corpus Christi were lower than the median EMC of 114 mg/L for urban highways. The fecal coliform concentrations for all the cities were above the EPA criteria of 200 CFU/100mL. TP concentrations also exceeded the EPA nutrient criteria of 0.01 mg/L (United States Environmental Protection Agency, 2002). EPA specifies nutrient criteria according to ecoregions. There are many ecoregions in Texas and 0.01 mg/L is the nutrient criteria for Ecoregion XI, which is the minimum concentration among

all the other ecoregions in the state.The median EMC for TKN for urban highways was reported as 1.83 mg/L. The TKN concentration for Corpus Christi, Houston, two of the sites in Dallas/Fort Worth, and two of the sites in Austin were higher than the median EMC reported in a report by the U.S. Department of Transportation (1990). The TN concentrations for all the sites were above the TN nutrient criteria specified by EPA, which is 0.38 mg/L for Ecoregion III. All zinc concentrations were below the median EMC of 329 μg/L for urban highways, except for one site in Austin. The median EMC is close to the EPA criteria of 320 μg/L for a hardness level of 100 mg/L as $CaCO_3$ (United States Environmental Protection Agency, 1986).

It should be noted that although the concentrations for many of the constituents of concern in highway runoff exceed EPA standards, the volume of runoff contributed by highways and roads is very small compared to the volume of runoff from underdeveloped land. According to EPA, agriculture impacts 59% of impaired river miles and 31% of impaired lake acres (United States Environmental Protection Agency, 2001).

4.2 Distribution of Impaired Streams and their Respective Impairments

Using the basemap of impaired water bodies, a query can be done by constituent to look at the distribution of water bodies impaired by that constituent. Most of the impaired water bodies in Texas are impacted by either bacteria or low dissolved oxygen concentrations. Other constituents account for a small percentage of the total.

4.2.1 Water Bodies Impaired by Bacteria

The distribution of water bodies in Texas impaired by bacteria is shown in Figure 4-10. The impaired water bodies are in red. There are 192 stream and lake segments that are impaired by bacteria according to the 2002 Draft 303(d) list for Texas. Many of these segments are located in the Houston/Galveston area.

Pathogens are a major concern in regards to human health. Fecal coliform is widely used as an indicator of the potential presence of pathogens in water. However, the results of other studies (Schroeder et al., 2002) indicate that the indicator organisms used to evaluate the biological quality of water bodies do not provide an accurate assessment of the presence of viruses and other organisms which represent the actual health threat. There also have been important cases (Schroeder et al., 2002) when indicator organisms were not present but pathogens were detected. Therefore, there does not appear to be a strong relationship between the presence of pathogens and the presence of indicator organisms. It was also concluded in the same study (Schroeder et al., 2002) that highway facilities do not appear to be a significant source of pathogens in urban drainage while high concentrations of indicator organisms were found in park lawn wash downs. This observation is important with respect to TxDOT's responsibility for this type of contamination in water bodies. The concentration of fecal coliform is much higher than the EPA criteria of 200 CFU/100mL at all the monitoring sites. However, the volume of runoff from highways would not be sufficient to materially affect receiving water bodies. Consequently, other sources of bacteria are more likely responsible for the majority of bacteria observed in surface waters. For example, concentration of fecal coliform from parks ranged from 50 to 200,000 MPN/100mL while the highest concentration of fecal coliform from roads, highways, and residential areas was 8,000 MPN/100mL (Schroeder et al., 2002).

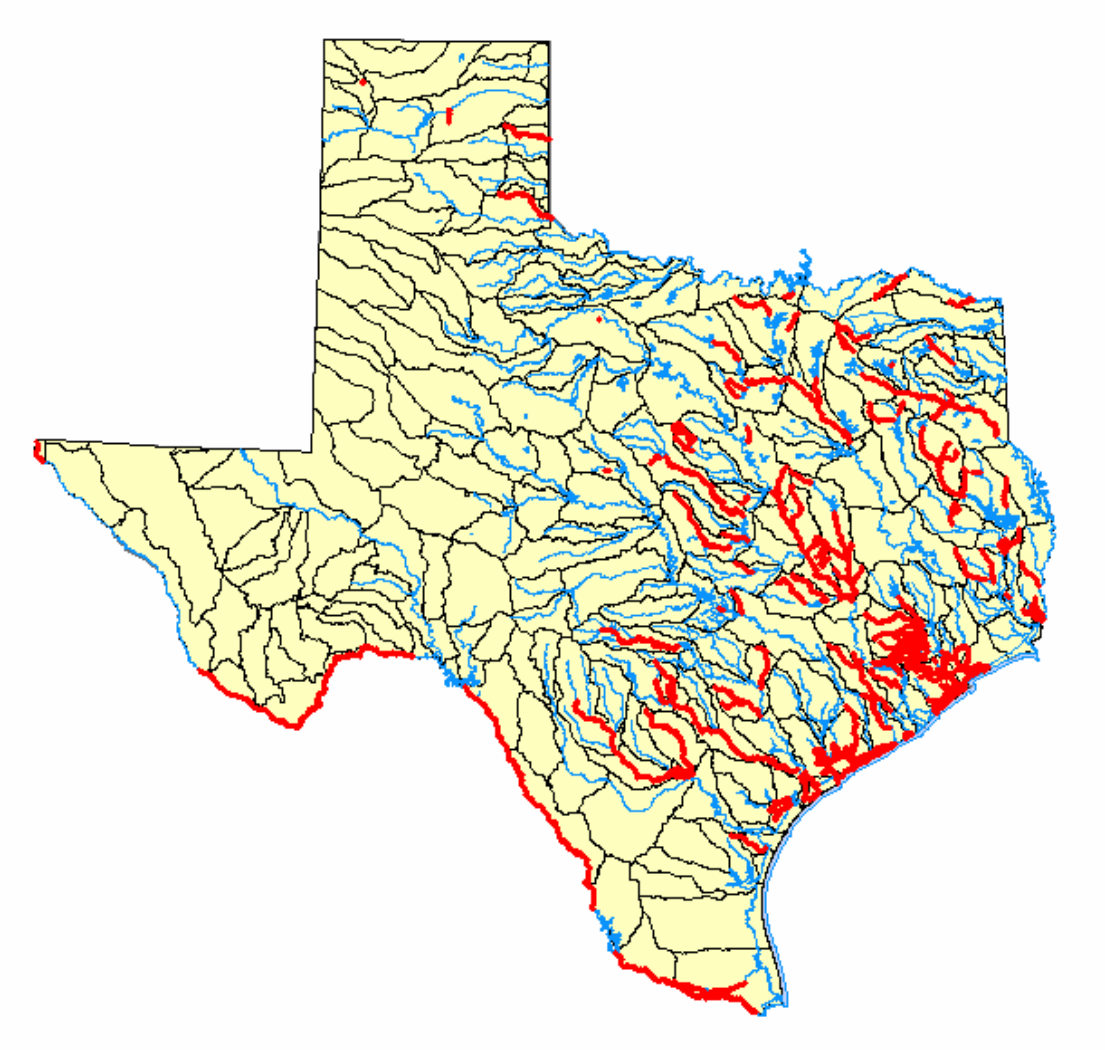

Figure 4-10: Water Bodies Impaired by Bacteria

4.2.2 Water Bodies Impaired by Low Dissolved Oxygen Levels

The distribution of water bodies in Texas impaired by low dissolved oxygen concentrations is shown in Figure 4-11. There are 104 water bodies impaired by low dissolved oxygen concentrations in the state. These water bodies mainly are located in East Texas and along the Gulf of Mexico.

Low dissolved oxygen concentrations in water bodies can cause eutrophication of lakes. Eutrophication is the process whereby a water body receives excessive nutrients like nitrogen and phosphorus causing the expanded growth of algae and other aquatic plants. The die-off and decomposition of these aquatic plants will deplete dissolved oxygen concentrations in the water body.

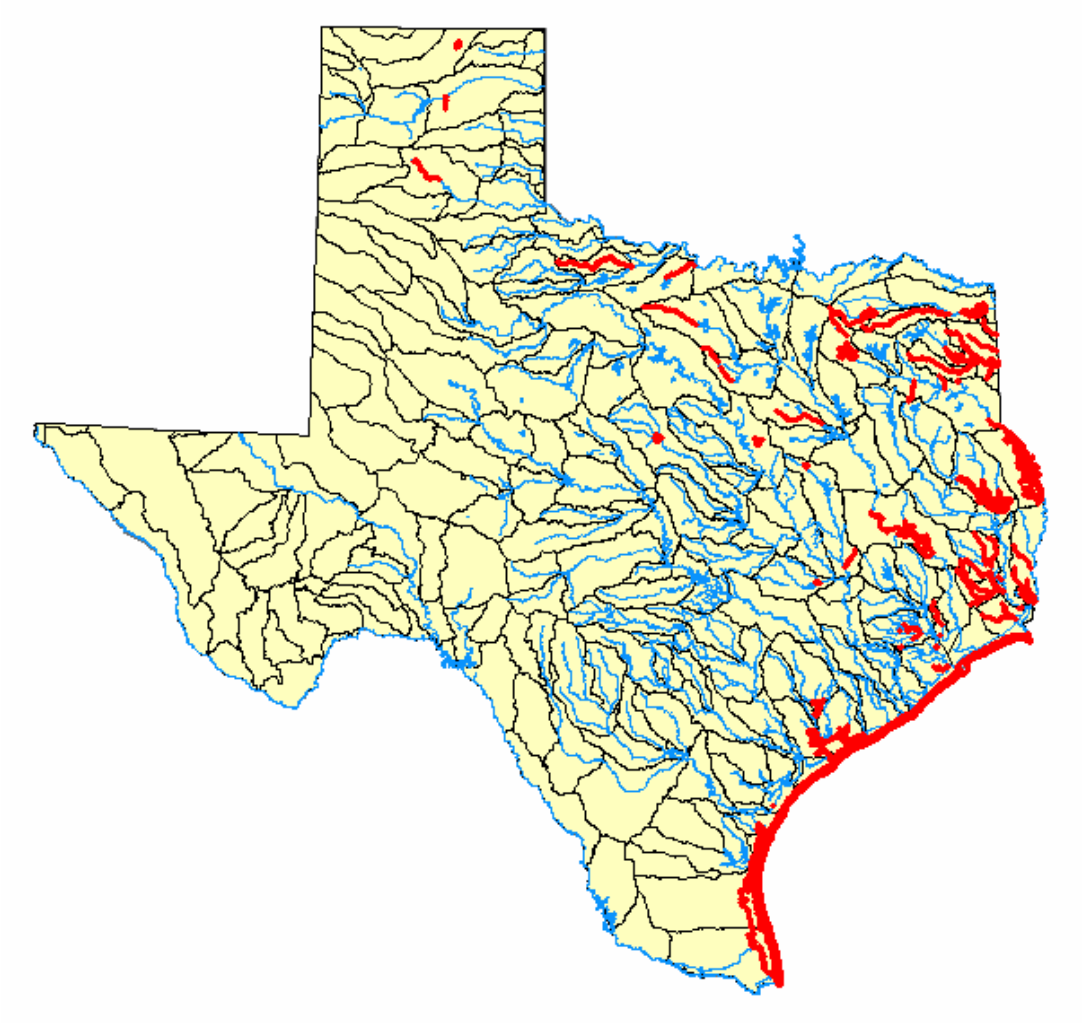

Figure 4-11: Water Bodies Impaired by Low Dissolved Oxygen Levels

4.3 Assessment of Currently-Installed BMPs

Many highway right-of-ways, especially in rural areas, include vegetated shoulders and channels for conveying storm water runoff. Pollutants can be removed as runoff travels through these vegetated areas through filtration, infiltration, adsorption, and sedimentation. This removal of pollutants occurs even though these areas may not be specifically designed for storm water treatment. Two different types of vegetative control exist: vegetated buffer strips and grassed swales.

Vegetated buffer strips accept runoff as overland sheet flow. Buffer strips are defined as vegetated pathways where constituents are removed by filtration through grass, deposition in low velocity areas, and infiltration and adsorption in the subsoil. Buffer strips typically remove suspended solids and particulate material. Constituent removal efficiency may be affected by dimensions of the strip, longitudinal slope, type of vegetation, and hydraulic loading rate. Increased removal of soluble nutrients and soluble metals may be accomplished with reduced flow rate, and increased contact time with soil and vegetation resulting in increased infiltration (Caltrans, 2003b).

Grassed swales are shallow, grass-lined, typically flat-bottomed channels with low slopes that convey storm water. Treatment occurs when the water flows down the swale. The mechanism for removing constituents in storm water runoff that occurs in grassed swales is filtration by the grass blades or other types of vegetation, sedimentation, infiltration into the soil, and biological activity in the soil media or grass blades. The removal efficiency of constituents in a grassed swale can be impacted by the length of the swale, water depth, and season (Caltrans, 2003b).

Two separate studies were performed on the effectiveness of vegetative controls in treating highway runoff. One study was performed over a two-year

period from 2001 to 2003 in California (Caltrans, 2003b). The vegetative control was vegetated buffer strips. Eight highway test sites were selected and at these sites, multiple storm water collection systems were installed and equipped with automated samplers to collect highway runoff that passed through the vegetated strip of varying widths. The quality and quantity of this runoff were compared to the runoff collected at the edge of the pavement to determine the changes in both pollutant concentration and loads.

The other study was conducted in Austin, Texas (Barrett et al., 1998). There were two different phases in this study. One was to determine the effects of individual parameters on the removal efficiency of constituents in highway runoff by constructing a laboratory scale grassed swale and the other was a field experiment on whether or not vegetative areas can effectively treat stormwater runoff at two different highway sites in Austin.

The results of these two studies demonstrated that substantial reduction in pollutant concentrations and load occurred in vegetated areas adjacent to highways. Highway runoff constituents that were studied included total suspended solids (TSS), nutrients (total phosphorus, total Kjeldahl nitrogen, and nitrate), and zinc. The data points in the following plots consist of four sampling locations in California, and three sampling locations in Texas. It should be noted that the number of data points is limited. Further studies should be done with more sampling locations to develop a more accurate representation of highway runoff data.

Probability plots were developed for the data obtained. These plots show that the concentrations in stormwater runoff in terms of total recoverable zinc and nitrate were within acceptable limits as determined by the EPA Gold Book criteria (United State Environmental Protection Agency, 1986). The relevant data are shown in Figure 4-12 and Figure 4-13. The data in Figure 4-12 indicate that

the standard of 320 μg/L for total recoverable zinc at a hardness level of 100 mg/L as $CaCO_3$ is never exceeded at any of the sites.

There are no aquatic life criteria for nitrate but for human health or domestic water supply, the effluent concentration of nitrate never exceeds the standard of 10 mg/L. The EPA nutrient criteria for TN is 0.38 mg/L for Ecoregion III. The data in Figure 4-14 indicate that the TN concentration exceeds the EPA nutrient criteria at 100% of the sites.

Although TSS is not a constituent of concern with respect to the water quality in Texas, it is an important constituent of stormwater runoff. The concentration limit of TSS from undisturbed land is 80 mg/L (Barrett, 1999). The data in Figure 4-15 show that this limit is rarely exceeded on average for storm water runoff after passing through vegetated areas.

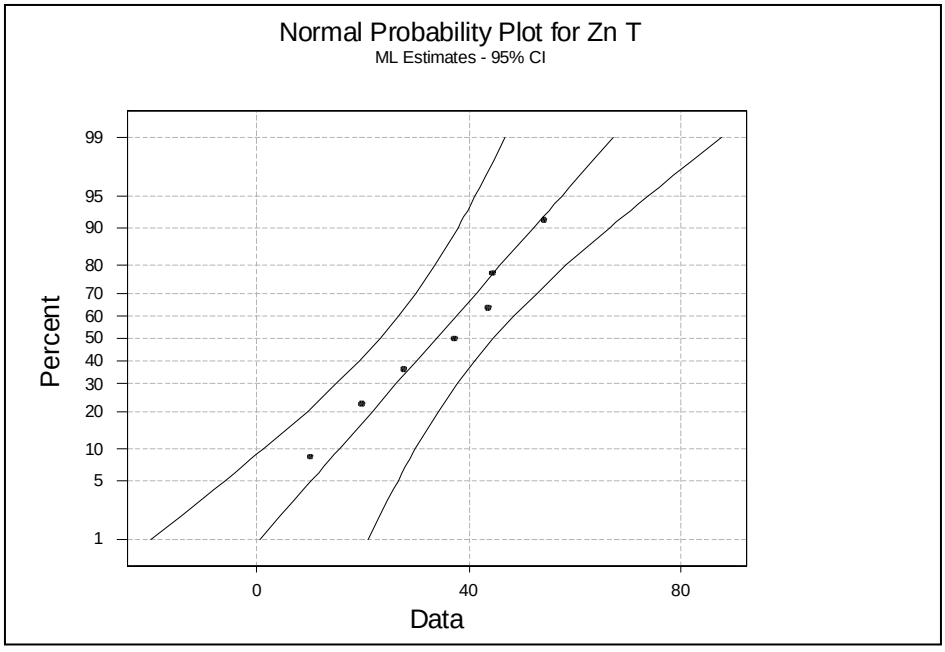

Figure 4-12: Probability Plot of Vegetated Area Effluent Water Quality for Total Recoverable Zinc (μg/L)

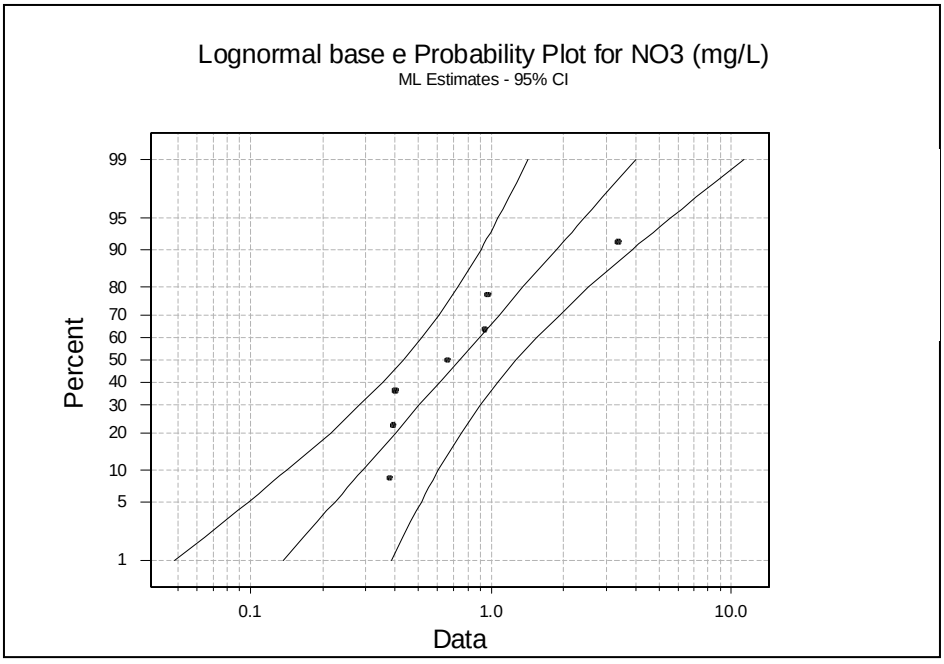

Figure 4-13: Probability Plot of Vegetated Area Effluent Water Quality for Nitrate (mg/L)

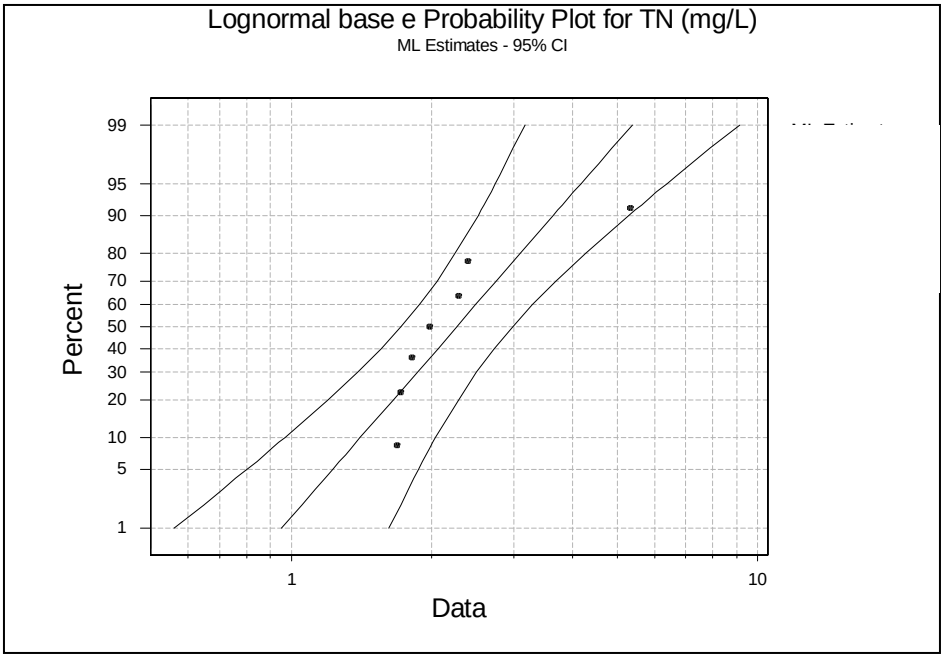

Figure 4-14: Probability Plot of Vegetated Area Effluent Water Quality for Total Nitrogen (mg/L)

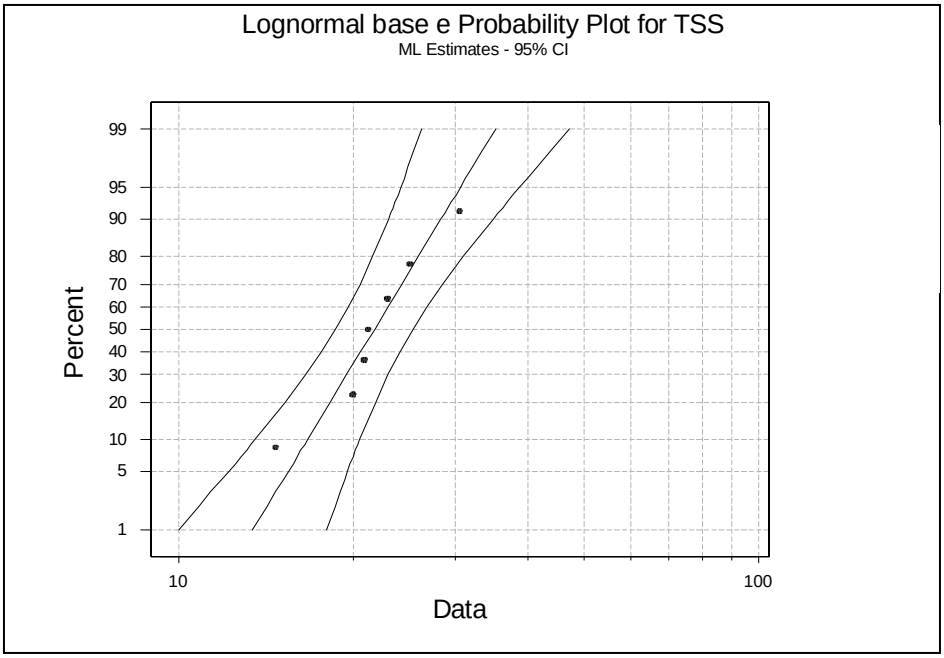

Figure 4-15: Probability Plot of Vegetated Area Effluent Water Quality for Total Suspended Solids (mg/L)

However, vegetative controls are not effective for treatment of all highway runoff constituents. The effluent concentration of fecal coliform exceeds the EPA Gold Book (United States Environmental Protection Agency, 1986) criteria for contact recreation of 200 CFU/100mL at 90% of the sites (Figure 4-16). The geometric mean of the fecal coliform concentrations was used to obtain the probability plot instead of the log-normal transformed average because the variance of the data was large. The average effluent concentration of total phosphorus exceeds the EPA nutrient criteria of 0.01 mg/L (United States Environmental Protection Agency, 2002). However, the data observed in Austin, Texas show that there was a 50% reduction in total phosphorus concentration for both the sampling locations between the concentration from the edge of pavement and concentration after the grassed swale. This comparison can be seen in Figure 4-18 and Figure 4-19.

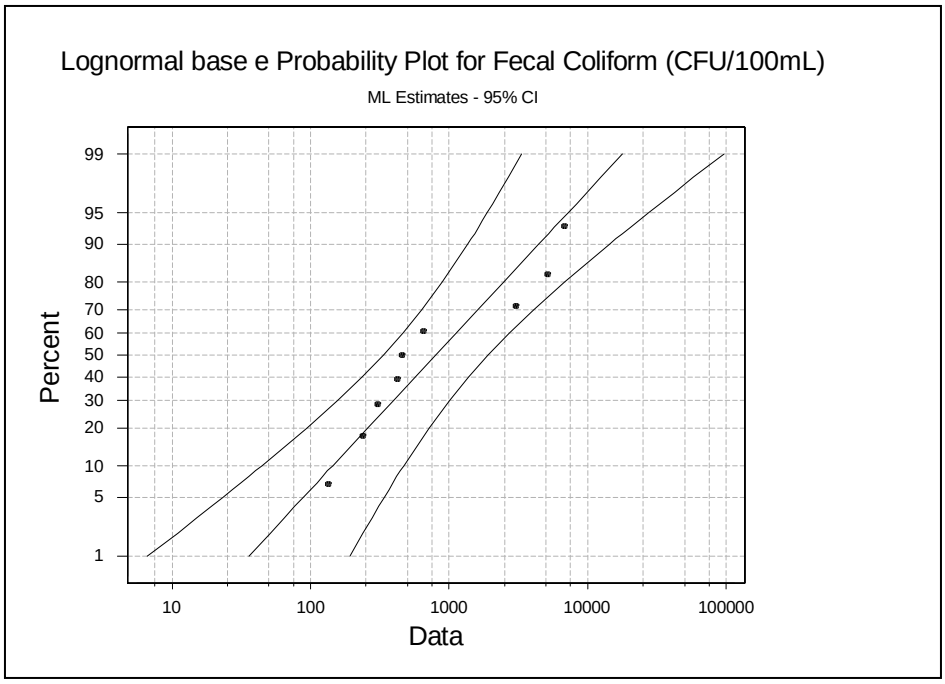

Figure 4-16: Probability Plot of Vegetated Area Effluent Water Quality for Fecal Coliform (CFU/100mL)

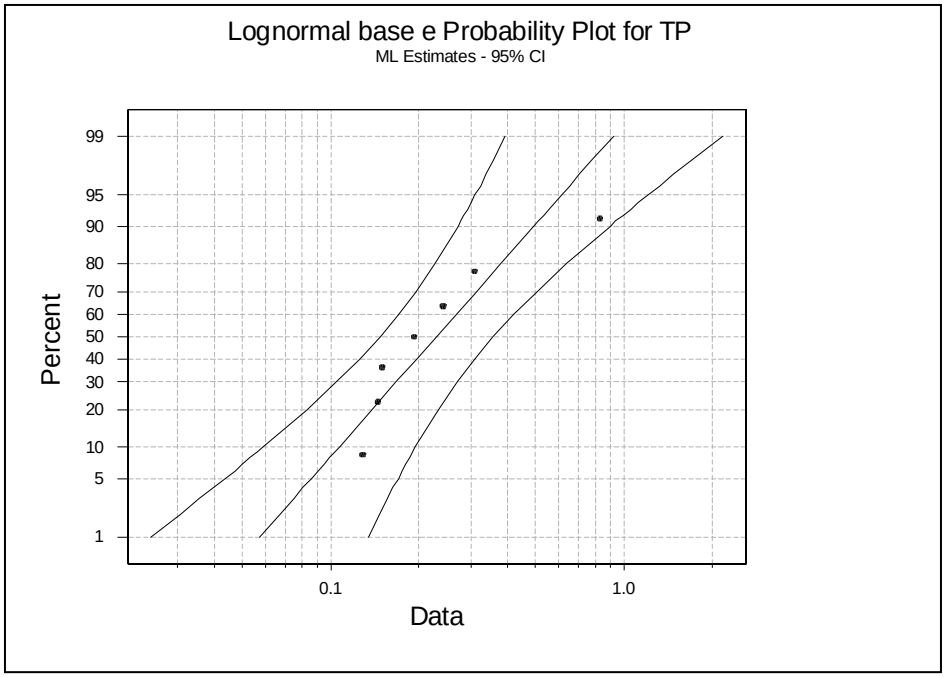

Figure 4-17: Probability Plot of Vegetated Area Effluent Water Quality for Total Phosphorus (mg/L)

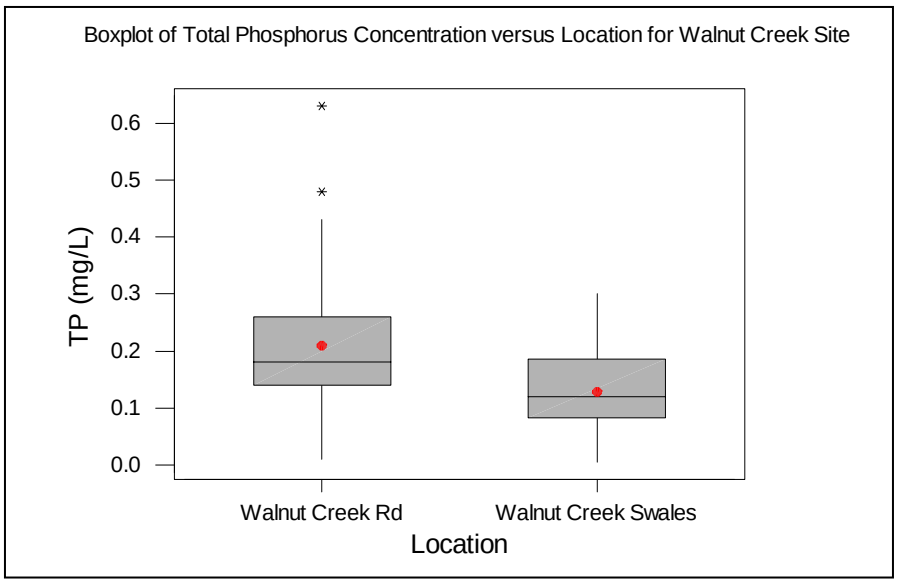

Figure 4-18: Comparison of Total Phosphorus Concentration for Edge of Pavement and Grassed Swale Effluent for Walnut Creek Site in Texas

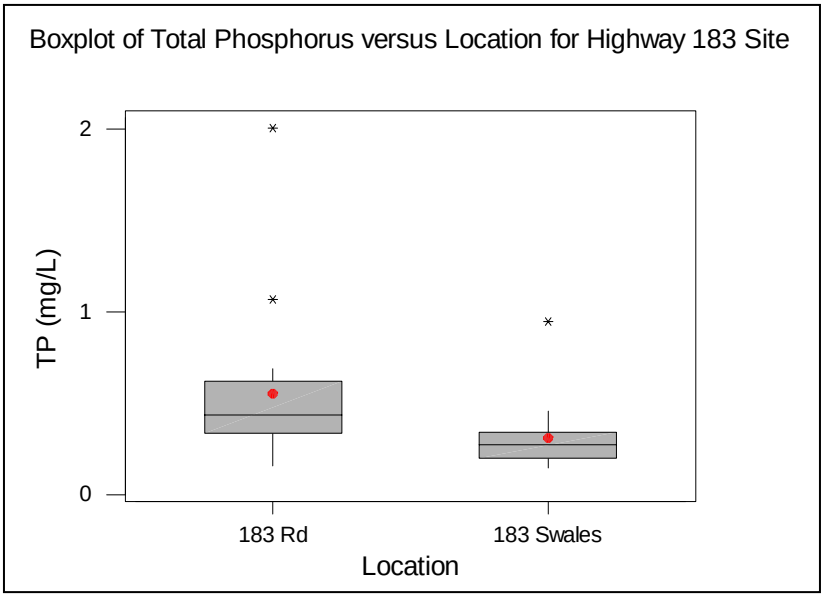

Figure 4-19: Comparison of Total Phosphorus Concentration for Edge of Pavement and Grassed Swale Effluent for Highway 183 Site in Texas

A significant difference in concentrations from edge of pavement (EOP) and concentration after passing through the vegetated area was observed for a few of the constituents that were studied for both the California and Texas projects. This difference is true for TSS and total recoverable zinc as shown by Figure 4-20 and Figure 4-21.

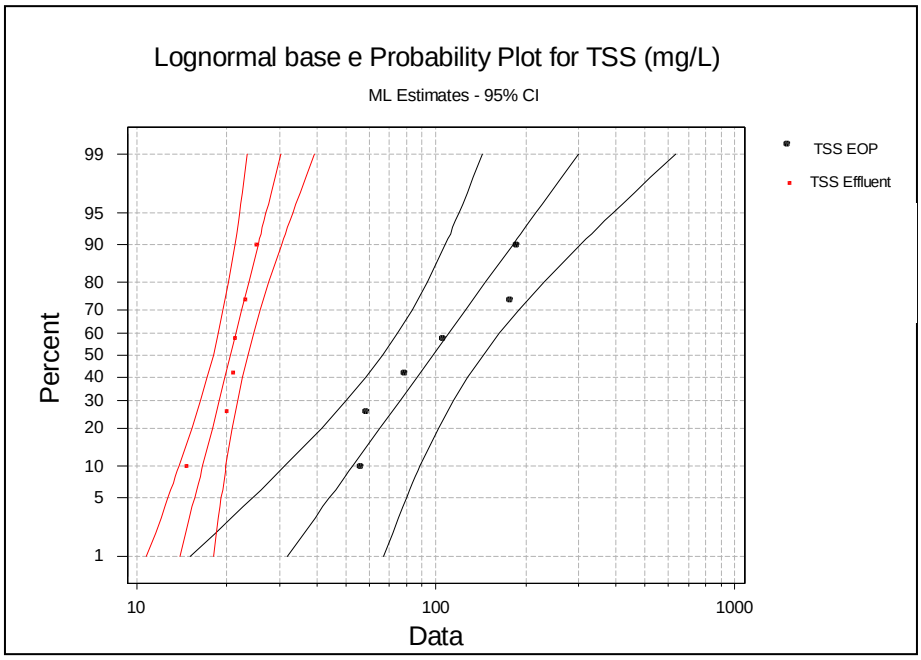

Figure 4-20: Comparison of Total Suspended Solids Concentration for Edge of Pavement and Vegetated Area Effluent

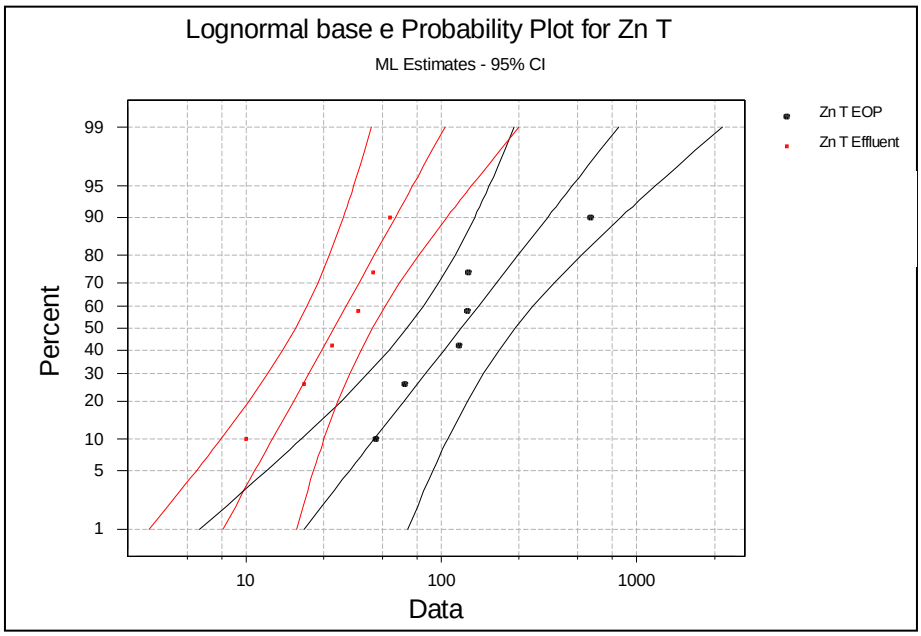

Figure 4-21: Comparison of Total Recoverable Zinc Concentrations for Edge of Pavement and Vegetated Area Effluent

Fecal coliform concentrations did not show any significant reduction from edge of pavement to the effluent of the vegetated area based on the use of ANOVA as shown in Figure 4-22. The concentration of nutrients (total phosphorus, nitrate, TKN, and TN) exhibited no overall significant reduction, i.e. for both the California and Texas studies as a whole even though for Texas alone, there was a significant reduction in total phosphorus concentration as shown in Figure 4-23, Figure 4-24, Figure 4-25, and Figure 4-26. This significant reduction could be the result of the sites being well established and the vegetation had reached a steady state condition where nutrient uptake was offset by leaching that occurred from dead and decaying vegetation.

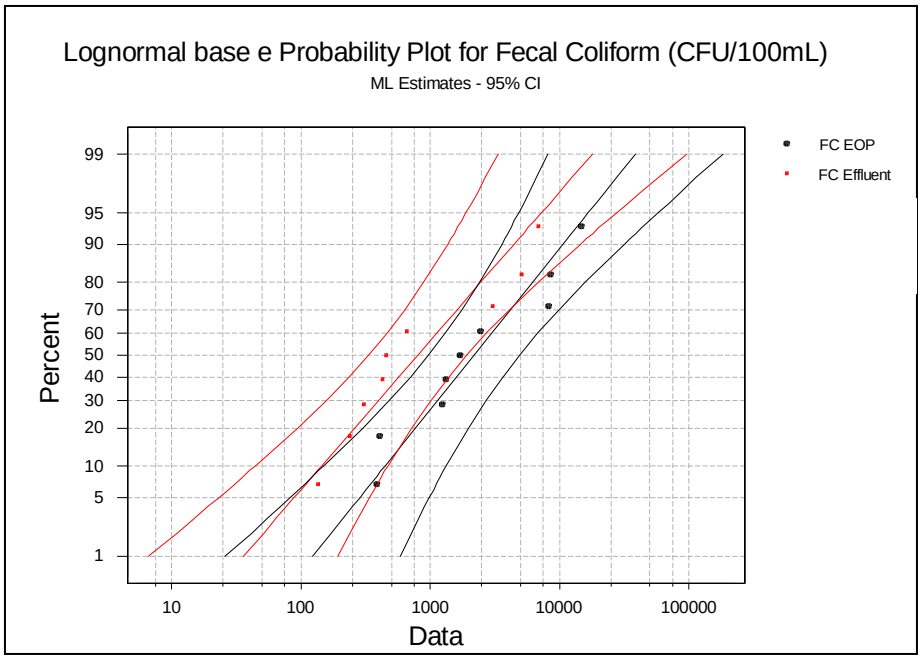

Figure 4-22: Comparison of Fecal Coliform Concentration for Edge of Pavement and Vegetated Area Effluent

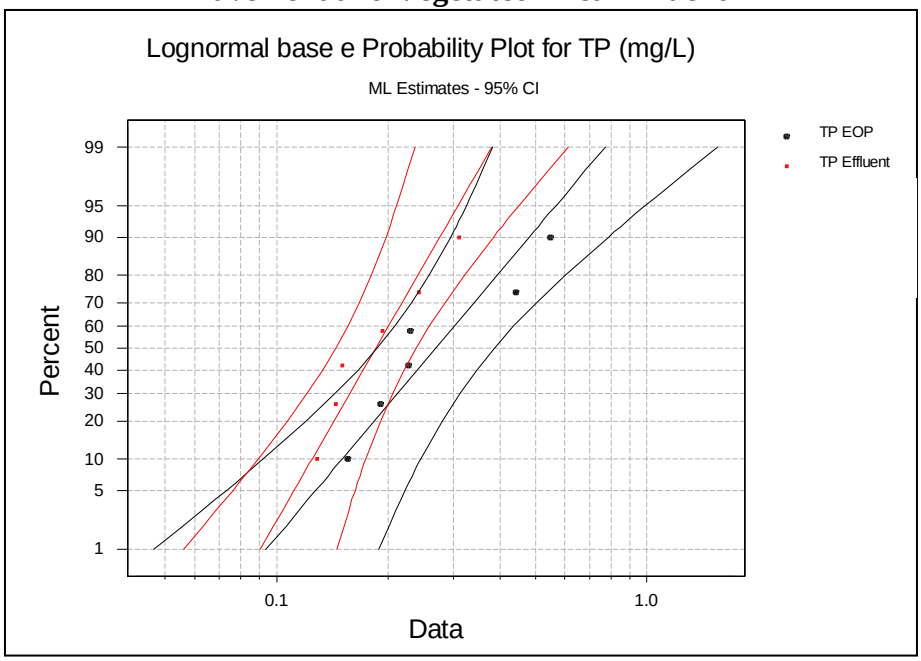

Figure 4-23: Comparison of Total Phosphorus Concentration for Edge of Pavement and Vegetated Area Effluent

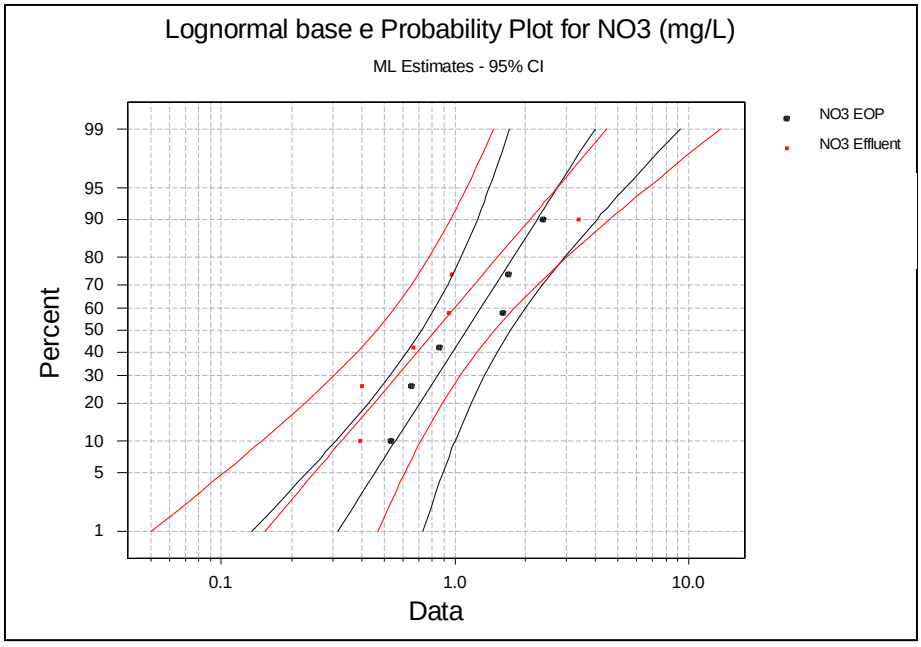

Figure 4-24: Comparison of Nitrate Concentration for Edge of Pavement and Vegetated Area Effluent

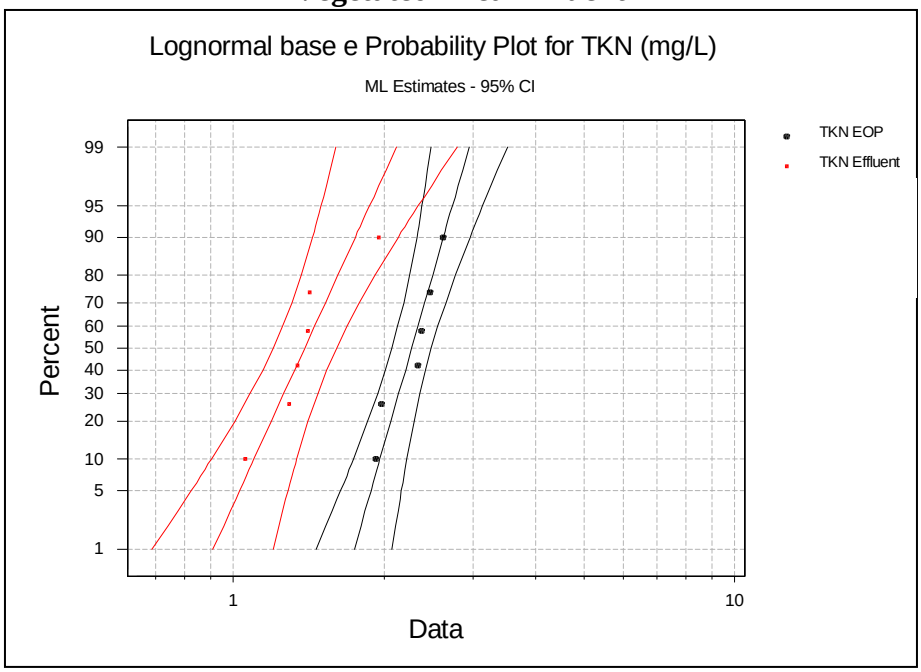

Figure 4-25: Comparison of Total Kjeldahl Nitrogen Concentration for Edge of Pavement and Vegetated Area Effluent

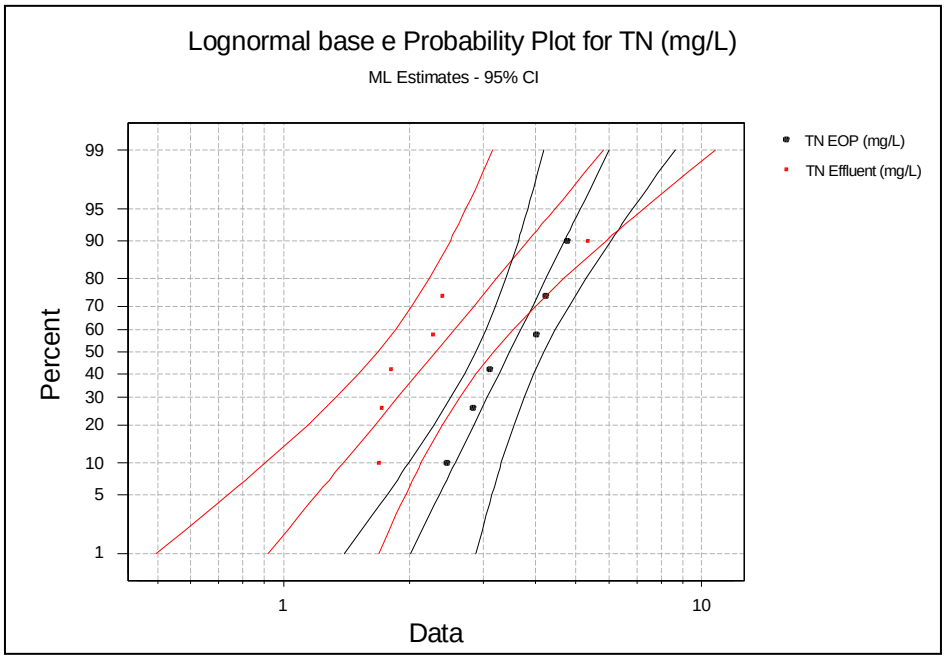

Figure 4-26: Comparison of Total Nitrogen Concentration for Edge of Pavement and Vegetated Area Effluent

It should also be noted that the concentration for total suspended solids reaches an irreducible minimum concentration after passing through buffer strips. Much of the removal of TSS occurs in the first 2 m of the strip (Caltrans, 2003b). There is no significant difference in the TSS concentration beyond this point. A boxplot of TSS in mg/L versus the length of the buffer strip in meters for the Sacramento site in California is shown in Figure 4-27. The data indicate that TSS concentrations dropped rapidly across the buffer strip from an average of about 55 mg/L at the edge of pavement to an irreducible minimum concentration about 20 mg/L.

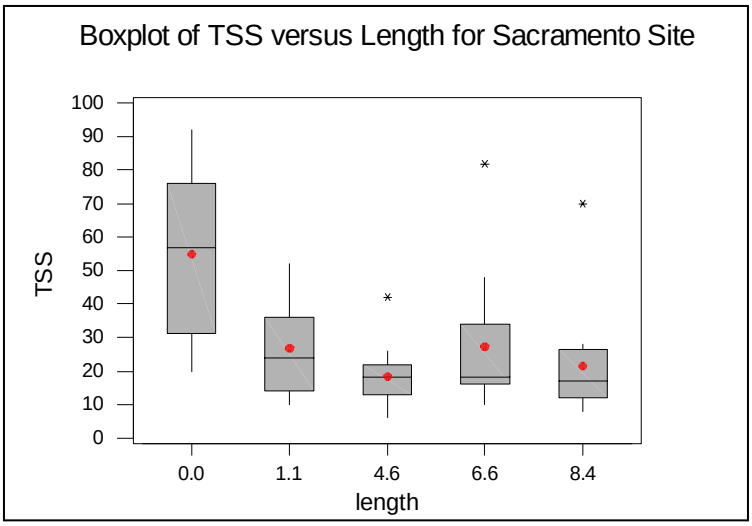

Figure 4-27: Boxplot showing the Effectiveness of the Biofiltration Strip in the California Study

The results indicate a substantial reduction in pollutant concentrations and loads for can occur in vegetated areas that are adjacent to highways, even when these vegetated areas are not designed primarily as treatment systems. These reductions are comparable to what is expected in engineered systems for treating highway runoff. However, as mentioned before, vegetative control systems are not very effective in removing pollutants like bacteria and nutrients. Therefore, there is no specific BMP that addresses the main causes of water quality impairments in Texas, which are bacteria and low dissolved oxygen.

It is not cost effective for TxDOT to implement BMPs or retrofit BMPs to existing highway facilities to address bacteria and nutrients because the available BMPs are not likely to remove these pollutants. However, it may be possible for TxDOT to pursue a watershed approach to help alleviate the water quality problems in Texas. Under this program, TxDOT could contribute financially to reduce the pollutant loadings from other sources to earn credit for or offset TxDOT's own pollutant loadings.

5 CONCLUSIONS AND RECOMMENDATIONS

The objective of this research was the development of documentation to aid TxDOT in anticipating the requirements of the TMDL process and to have data at hand to respond if or when TxDOT is identified as a contributor to impairments in receiving water bodies. Highway runoff monitoring data was obtained from around the state and these data were analyzed statistically and compared with EPA standards and also typical highway runoff concentrations. A GIS coverage of the impaired water bodies in Texas was developed in ArcGIS to give TxDOT a visualization of the distribution of impaired streams and where planned highway facilities can potentially contribute to impairments in the receiving water bodies. The performance of currently installed BMPs was assessed with available monitoring data and a toolbox of BMPs that address specific water quality constituents was created.

5.1 Conclusions

1. The 2003 Draft 303(d) List of Impaired Water Bodies in the state of Texas currently includes 299 water bodies.
2. The most common impairments in Texas water bodies are the result of bacteria (192 water bodies) and depressed oxygen concentrations (104 water bodies).
3. Highways in Texas contribute nutrients (TKN, nitrates, TP, and TN), TSS, bacteria, and metals to receiving water bodies.
4. Highway runoff is a very small contributor to total runoff in terms of volume. Therefore, mass loadings of fecal coliform, total phosphorus, and

total nitrogen in Texas highways are not major contributors to the impairments because of the small volume of highway runoff.

5. Highway facilities do not appear to be a significant source of pathogens in urban drainage despite elevated concentrations of indicator organisms.
6. Vegetated swales and vegetated buffer strips were effective in the removal of TSS and metals but were not effective in the removal of phosphorus and nitrogen.
7. The best BMPs for removing constituents are wet basins, infiltration and retention systems like infiltration basins and trenches.
8. No BMPs are effective for the removal of bacteria and nutrients from stormwater.

5.2 Recommendations

TxDOT could be identified by TCEQ as a contributor to water quality impairments in receiving streams. TxDOT can use the following statements to respond to TCEQ.

1. Highway runoff volume is very small compared to runoff from underdeveloped land.
2. There is no specific tool or BMP that effectively addresses water quality concerns related to bacteria and low dissolved oxygen concentrations, which are the main causes of impairment.
3. It would not be cost effective to address a water quality problem that TxDOT cannot solve.
4. TxDOT could pursue a pollutant trading program as an alternative to implementing BMPs. Under this program, TxDOT could contribute financially to reduce the pollutant loadings from other sources or dischargers and use that as credit for TxDOT's pollutant loadings.

APPENDIX A

Draft 2003 Section 303(d) List for the State of Texas

SegID: **0101A Dixon Creek (unclassified water body)**
Water body location: From confluence of the Canadian River to the upstream perennial portion of the stream east of Borger in Hutchinson County
Overall Category: **5b**

Category	Parameter	Area	Rank
5c	bacteria	Entire water body	D
5b	depressed dissolved oxygen	Entire water body	S

SegID: **0102 Lake Meredith**
Water body location: From Sanford Dam in Hutchinson County to a point immediately upstream of the confluence of Camp Creek in Potter County, up to normal pool level of 2936.5 feet (impounds Canadian River)
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	mercury in walleye	Downstream half of lake	M
5a	mercury in walleye	Upstream half of lake	M

SegID: **0105 Rita Blanca Lake**
Water body location: From Rita Blanca Dam in Hartley County up to normal pool level of 3860 feet (impounds Rita Blanca Creek)
Overall Category: **5b**

Category	Parameter	Area	Rank
5b	bacteria	Entire segment	S
5b	high pH	Entire segment	S
5b	total dissolved solids	Entire segment	S

SegID: **0199A Palo Duro Reservoir (unclassified water body)**
Water body location: From Palo Duro dam up to normal pool elevation of 2,892 feet north of Spearman in Hansford County (impounds Palo Duro Creek)
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	Entire reservoir	D

SegID: **0201A Mud Creek (unclassified water body)**
Water body location: From the confluence of the Red River to the upstream perennial portion of the stream northwest of De Kalb in Bowie County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire water body	D

SegID: **0202D Pine Creek (unclassified water body)**
Water body location: From the confluence of the Red River to the upstream perennial portion of the stream west of Paris in Lamar County

Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire water body	D

SegID: **0203A Big Mineral Creek (unclassified water body)**
Water body location: From the confluence of Lake Texoma to the confluence of North/Middle/South Big Mineral Creeks north of Whitesboro in Grayson County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire water body	D

SegID: **0207A Buck Creek (unclassified water body)**
Water body location: From Oklahoma State Line east of Childress in Childress County to the upstream perennial portion of the stream west of Wellington in Collinsworth County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Lower 25 miles	L

SegID: **0211 Little Wichita River**
Water body location: From the confluence with the Red River in Clay County to Lake Arrowhead Dam in Clay County
Overall Category: **5b**

Category	Parameter	Area	Rank
5b	depressed dissolved oxygen	East Fork confluence to dam	S
5b	total dissolved solids	East Fork confluence to dam	S
5b	total dissolved solids	Lower end of segment to East Fork confluence	S

SegID: **0214A Beaver Creek (unclassified water body)**
Water body location: From the confluence of the Wichita River west of Wichita Falls in Wichita County to the upstream perennial portion of the stream south of Vernon in Wilbarger County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	Lower 25 miles of segment	D
5c	depressed dissolved oxygen	Upper 23 miles of segment	D

SegID: **0218 Wichita/North Fork Wichita River**
Water body location: From a point 9.4 kilometers (5.8 miles) downstream of the confluence of Crooked Creek in Baylor County to a point 8.5 kilometers (5.3 miles) downstream of the most upstream crossing of FM 193 in Dickens County)
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	selenium (chronic) in water	Cottle county line to King County line	D
5c	selenium (chronic) in water	FM 287 to Foard County line	D
5c	selenium (chronic) in water	Foard County line to Cottle County line	D
5c	selenium (chronic) in water	King County line to end of segment	D

SegID: **0218A Middle Fork Wichita River (unclassified water body)**
Water body location: From the confluence of the North Wichita River southwest of Crowell in Foard County to the upstream perennial portion of the stream northeast of Guthrie in King County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	selenium (chronic) in water	Lower 30 miles of water body	D

SegID: **0229 Upper Prairie Dog Town Fork Red River**
Water body location: From a point 100 meters (110 yards) upstream of the confluence of Salt Fork in Armstrong County to Lake Tanglewood Dam in Randall County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	Palo Duro Canyon State Park upstream boundary to upper end of segment	D

SegID: **0299A Sweetwater Creek (unclassified water body)**
Water body location: From the Oklahoma stateline in Wheeler County to the upstream perennial portion of the stream northwest of Wheeler in Wheeler County (tributary of North Fork Red River)
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Lower 25 miles	D

SegID: **0302 Wright Patman Lake**
Water body location: From Wright Patman Lake Dam in Bowie/Cass County to a point 1.5 kilometers (0.9 miles) downstream of Bassett Creek in Bowie/Cass County, up to the normal pool elevation of 225 feet (impounds the Sulphur River)
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	1600 acres in upper mid-lake	D
5c	high pH	1600 acres in upper mid-lake	D
5c	depressed dissolved oxygen	200 acres in the northwestern tip of lake	D
5c	high pH	200 acres in the northwestern tip of lake	D
5c	high pH	2300 acres in arm, west of dam	D
5c	depressed dissolved oxygen	400 acres, south dam	D
5c	depressed dissolved oxygen	4000 acres in upper portion of lake	D
5c	high pH	4000 acres mid-lake	D
5c	high pH	500 acres in the northeast corner of lake	D

SegID: **0303B White Oak Creek (unclassified water body)**
Water body location: From the confluence of the Sulphur River north of Naples in Morris County to the upstream perennial portion of the stream east of Sulphur Springs in Hopkins County
Overall Category: **5b**

Category	Parameter	Area	Rank
5b	depressed dissolved oxygen	Lower 25 miles of segment	S
5b	depressed dissolved oxygen	Middle 25 miles near Hwy 271	S

SegID: **0306 Upper South Sulphur River**
Water body location: From a point 1.0 km (0.6 miles) upstream of SH 71 in Delta/Hopkins County to SH 78 in Fannin County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	high pH	25 miles above SH 11	D
5c	bacteria	Lower 6 miles	D
5c	depressed dissolved oxygen	Lower 6 miles	D

SegID: **0307 Cooper Lake**
Water body location: From Delta/Hopkins County Dam in Delta/Hopkins County to a point 1.0 km (0.6 miles) upstream of SH 71 on the South Sulphur River Arm in Delta/Hopkins County and 300 meters (330 yards) below the confluence of Barnett Creek on the Middle Sulphur River in Delta County, up to conservation pool elevation of 440 feet (impounds the Middle Sulphur/South Sulphur River)
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	Lower 3000 acre Doctors Creek arm	D
5c	high pH	Lower 3000 acre Doctors Creek arm	D
5c	depressed dissolved oxygen	Lower 5000 acres near dam	D
5c	high pH	Lower 5000 acres near dam	D
5c	high pH	Middle 5000 acres	D

SegID: **0401 Caddo Lake**
Water body location: From the Louisiana State Line in Harrison/Marion County to a point 12.3 km (7.6 miles) downstream of SH 43 in Harrison/Marion County, up to pool elevation of 168.5 feet (impounds Big Cypress Creek)
Overall Category: **5a**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	Clinton Lake	D
5c	low pH	Clinton Lake	D
5a	mercury in largemouth bass and freshwater drum	Clinton Lake	H
5a	mercury in largemouth bass and freshwater drum	Goose Prairie arm	H
5c	depressed dissolved oxygen	Harrison Bayou arm	D
5a	mercury in largemouth bass and freshwater drum	Harrison Bayou arm	H
5c	depressed dissolved oxygen	Hells Half Acre	D
5a	mercury in largemouth bass and freshwater drum	Hells Half Acre	H
5a	mercury in largemouth bass and freshwater drum	Lower 5000 acres	H
5a	mercury in largemouth bass and freshwater drum	Mid-lake near Uncertain	H
5a	mercury in largemouth bass and freshwater drum	Pine Island	H

5a	mercury in largemouth bass and freshwater drum	Remainder of segment	H

SegID: **0401A Harrison Bayou (unclassified water body)**
Water body location: From the confluence of Caddo Lake east of Karnack in Harrison County to the upstream perennial portion of the stream east of Marshall in Harrison County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	Lower 5 miles	D
5c	depressed dissolved oxygen	Middle 3 miles near Bill Coleman Road	D
5c	depressed dissolved oxygen	Middle 3 miles near FM 134	D

SegID: **0402 Big Cypress Creek Below Lake O' the Pines**
Water body location: From a point 12.3 km (7.6 miles) downstream of SH 43 in Harrison/Marion County to Ferrell's Bridge Dam in Marion County
Overall Category: **5a**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	11 miles below Black Cypress Creek	D
5c	low pH	11 miles below Black Cypress Creek	D
5a	mercury in fish tissue	11 miles below Black Cypress Creek	M
5c	depressed dissolved oxygen	Lower 9 miles	D
5a	mercury in fish tissue	Lower 9 miles	M
5a	mercury in fish tissue	Middle 15 miles near Jefferson	M
5a	mercury in fish tissue	Upper 7 miles	M

SegID: **0402A Black Cypress Bayou (unclassified water body)**
Water body location: Perennial stream from the confluence with Big Cypress in Marion County up to 7.5 miles above FM 250 in Cass County.
Overall Category: **5a**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	Middle 1 mile, Pruitt Lake	D
5a	mercury in fish tissue	Middle 1 mile, Pruitt Lake	M

SegID: **0402D Lake Daingerfield (unclassified water body)**
Water body location: Southeast of the City of Daingerfield in Daingerfield State Park in Morris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	mercury in fish tissue	Entire lake	M

SegID: **0403 Lake O' the Pines**
Water body location: From Ferrell's Bridge Dam in Marion County to a point 1.0 km (0.6 miles) downstream of US 259 in Morris/Upshur County, up to normal pool elevation of 228.5 feet (impounds Big Cypress Creek)
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	Upper 3700 acres	D

SegID: **0404 Big Cypress Creek Below Lake Bob Sandlin**
Water body location: From a point 1.0 km (0.6 miles) downstream of US 259 in Morris/Upshur Counties to Fort Sherman Dam in Camp/Titus Counties
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Upper 18 miles	D

SegID: **0404B Tankersley Creek (unclassified water body)**
Water body location: Perennial stream from the confluence with Big Cypress Creek upstream to the confluence with an unnamed tributary 250 meters upstream of IH 30
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	3 miles below Tankersley Lake	D
5c	bacteria	Middle 2 miles near FM 127	D

SegID: **0404D Welsh Reservoir (unclassified water body)**
Water body location: From Titus County Dam up to normal pool level located between Mt. Pleasant and Daingerfield in Titus County (impounds Swauano and Justiss Creeks)
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	selenium in fish tissue	Entire segment	H

SegID: **0406 Black Bayou**
Water body location: From the Louisiana State Line in Cass County to FM 96 in Cass County
Overall Category: **5b**

Category	Parameter	Area	Rank
5b	depressed dissolved oxygen	Lower 12 miles	S

SegID: **0407 James' Bayou**
Water body location: From the Louisiana State Line in Marion County to Club Lake Road northwest of Linden in Cass County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	Lower 15 miles of segment	D
5c	depressed dissolved oxygen	Upper 25 miles of segment	D

SegID: **0409 Little Cypress Bayou (Creek)**
Water body location: From the confluence of Big Cypress Creek in Harrison/Marion County to a point 1.0 km (0.6 miles) upstream of FM 2088 in Wood County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	Lower 25 miles of segment	D
5c	depressed dissolved oxygen	Middle 18 miles above Hwy 154	D
5c	depressed dissolved oxygen	Middle 25 miles below Hwy 271	D

SegID: **0502A Nichols Creek (unclassified water body)**
Water body location: From the confluence of the Sabine River to the upstream perennial portion of the stream south of Kirbyville in Newton and Jasper Counties
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Lower 25 miles of creek	D
5c	chronic toxicity in water	Lower 25 miles of creek	D
5c	depressed dissolved oxygen	Lower 25 miles of creek	D

SegID: **0504 Toledo Bend Reservoir**
Water body location: From Toledo Ben Dam in Newton County to a point immediately upstream of the confluence of Murvaul Creek in Panola County, up to the normal pool elevation of 172 feet (impounds the Sabine River)
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	mercury in largemouth bass and freshwater drum	Lowermost 5120 acres of reservoir, adjacent to dam	M
5a	mercury in largemouth bass and freshwater drum	Near SH 21	M
5a	mercury in largemouth bass and freshwater drum	Patroon Bayou Branch arm	M
5a	mercury in largemouth bass and freshwater drum	Remainder of reservoir	M
5a	mercury in largemouth bass and freshwater drum	Six Mile Boat Lane arm	M
5a	mercury in largemouth bass and freshwater drum	Sunshine Bay arm	M
5c	depressed dissolved oxygen	Tenaha Creek arm	D
5a	mercury in largemouth bass and freshwater drum	Tenaha Creek arm	M
5a	mercury in largemouth bass and freshwater drum	Uppermost 5120 acres of reservoir	M

SegID: **0504C Palo Gaucho Bayou (unclassified water body)**
Water body location: From the confluence with Toledo Bend Reservoir in Sabine County to the headwaters northeast of San Augustine in San Augustine County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	chronic toxicity in water	Entire bayou	D

SegID: **0505 Sabine River Above Toledo Bend Reservoir**
Water body location: From a point immediately upstream of the confluence of Murvaul Creek in Panola County to a point 100
meters (110 yards) downstream of US 271 in Gregg County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	22 mile reach near SH 149	D

SegID: **0505B Grace Creek (unclassified water body)**
Water body location: Perennial stream from the confluence with the Sabine River up to FM 1844 in Gregg County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Upper 12.3 miles	D
5c	depressed dissolved oxygen	Upper 12.3 miles	D

SegID: **0505D Rabbit Creek (unclassified water body)**
Water body location: From the confluence with the Sabine River near Kilgore in Gregg County to the headwaters west of Overton in Smith County.
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Lower 5.7 miles	D

SegID: **0505E Brandy Branch Reservoir (unclassified water body)**
Water body location: From Harrison County Dam up to normal pool elevation of 340 feet southwest of Marshall in Harrison County (impounds Brandy Branch)
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	selenium in fish tissue	Entire reservoir	H

SegID: **0505F Martin Creek Reservoir (unclassified water body)**
Water body location: From Rusk County Dam up to normal pool elevation of 306 feet northeast of Henderson in Rusk County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	selenium in fish tissue	Entire reservoir	H

SegID: **0505G Wards Creek (unclassified water body)**
Water body location: From the confluence with Hatley Creek to the headwaters east of Hallsville in Harrison County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	Entire water body	D

SegID: **0506 Sabine River Below Lake Tawakoni**
Water body location: From a point 100 meters (110 yards) downstream of US 271 in Gregg County to Iron Bridge Dam in Rains County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Lower 16 miles	D

SegID: **0506A Harris Creek (unclassified water body)**
Water body location: From the confluence of the Sabine River northeast of Winona in Smith County to the upstream perennial portion of the stream east of Tyler in Smith County
Overall Category: **5b**

Category	Parameter	Area	Rank
5b	depressed dissolved oxygen	Entire creek	S

SegID: **0507 Lake Tawakoni**
Water body location: From Iron Bridge Dam in Rains County up to normal pool elevation of 437 feet (impounds Sabine River)
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	Lowermost 5,120 acres of reservoir, adjacent to dam	D

SegID: **0507A Cowleech Fork Sabine River (unclassified water body)**
Water body location: From the confluence of Lake Tawakoni southeast of Greenville in Hunt County to the upstream perennial portion of the stream south of Celeste in Hunt County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Lower 10 miles, downstream of Long Branch confluence	D
5c	bacteria	Upper 20 miles, upstream of Long Branch confluence	D
5c	depressed dissolved oxygen	Upper 20 miles, upstream of Long Branch confluence	D

SegID: **0507B Long Branch (unclassified water body)**
Water body location: From the confluence with Cowleech Fork Sabine River to the upstream perennial portion of the stream in Greenville in Hunt County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire creek	D

SegID: **0508 Adams Bayou Tidal**
Water body location: From the confluence with the Sabine River in Orange County to a point 1.1 km (0.7 miles) upstream of IH 10 in Orange County
Overall Category: **5a**

Category	Parameter	Area	Rank
5c	bacteria	1 mile reach near Green Avenue	D
5c	depressed dissolved oxygen	1 mile reach near Green Avenue	D
5a	bacteria	2 mile reach near Western Avenue	L
5c	depressed dissolved oxygen	2 mile reach near Western Avenue	D
5c	depressed dissolved oxygen	Lower 3 miles of segment	D
5c	bacteria	Upper 2 miles of segment	D
5c	depressed dissolved oxygen	Upper 2 miles of segment	D

SegID: **0508A Adams Bayou Above Tidal (unclassified water body)**
Water body location: From a point 1.1 km (0.7 miles) upstream of IH 10 in Orange County to the upstream perennial portion of the stream northwest of Orange in Orange County
Overall Category: **5b**

Category	Parameter	Area	Rank
5c	bacteria	Entire bayou above tidal	D
5b	depressed dissolved oxygen	Entire bayou above tidal	S

SegID: **0508B Gum Gully (unclassified water body)**
Water body location: From the confluence of Adams Bayou to the upstream perennial portion of the stream northwest of Orange in Orange County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire creek	D
5c	depressed dissolved oxygen	Entire creek	D

SegID: **0508C Hudson Gully (unclassified water body)**
Water body location: From the confluence with Adams Bayou to the headwaters near US 890 in Pinehurst in Orange County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire creek	H
5c	depressed dissolved oxygen	Entire creek	D

SegID: **0511 Cow Bayou Tidal**
Water body location: From the confluence with the Sabine River in Orange County to a point 4.8 km (3.0 miles) upstream of IH 10 in Orange County
Overall Category: **5b**

Category	Parameter	Area	Rank
5b	depressed dissolved oxygen	5 mile reach near FM 1442 (north crossing)	S
5b	depressed dissolved oxygen	6 mile reach near FM 105	S
5c	bacteria	Lower 5 miles	D

5b	depressed dissolved oxygen	Lower 5 miles	S
5c	bacteria	Upper 4 miles	D
5b	depressed dissolved oxygen	Upper 4 miles	S
5b	low pH	Upper 4 miles	S

SegID: **0511A Cow Bayou Above Tidal (unclassified water body)**
Water body location: From a point 4.8 km (3.0 miles) upstream of IH 10 in Orange County to the upstream perennial portion of the stream northeast of Vidor in Orange County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	Upper 5.3 miles of above-tidal reach	D

SegID: **0511B Coon Bayou (unclassified water body)**
Water body location: From the confluence with Cow Bayou up to the extent of tidal limit in Orange County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire tidal reach	D
5c	depressed dissolved oxygen	Entire tidal reach	D

SegID: **0511C Cole Creek (unclassified water body)**
Water body location: From the confluence of Cow Bayou west of Orange in Orange County to the upstream perennial portion of the stream south of Mauriceville in Orange County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire tidal reach	D
5c	depressed dissolved oxygen	Entire tidal reach	D

SegID: **0511E Terry Gully (unclassified water body)**
Water body location: From the confluence with Cow Bayou in Orange County to the headwaters northeast of Vidor in Orange County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire creek	D

SegID: **0512A Running Creek (unclassified water body)**
Water body location: From the confluence with Lake Fork Reservoir to the headwaters southeast of Martin Springs in Hopkins County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire creek	D

SegID: **0512B Elm Creek (unclassified water body)**
Water body location: From the confluence with Lake Fork Reservoir in Rains County to the headwaters northwest of Shirley in Hopkins County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire creek	D

SegID: **0601A Star Lake Canal (unclassified water body)**
Water body location: North of Groves in Jefferson County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	Entire water body	D

SegID: **0602A Booger Branch (unclassified water body)**
Water body location: From the confluence of Massey Lake Slough south of Silsbee to a point 0.6 miles (1.0 km) upstream of US 96 in Hardin County
Overall Category: **5b**

Category	Parameter	Area	Rank
5b	depressed dissolved oxygen	Entire water body	S

SegID: **0603 B. A. Steinhagen Lake**
Water body location: From Town Bluff Dam in Jasper/Tyler County to a point immediately upstream of the confluence of Hopson Mill Creek on the Neches River Arm in Jasper/Tyler County and to a point immediately upstream of the confluence of Indian Creek on the Angelina River Arm in Jasper County, up to the normal pool elevation of 83 feet (impounds Neches River)
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	mercury in white and hybrid white/striped bass	Main pool by dam	M
5a	mercury in white and hybrid white/striped bass	Remainder of reservoir	M

SegID: **0603A Sandy Creek (unclassified water body)**
Water body location: From the confluence of B.A. Steinhagen Lake southwest of Jasper in Jasper County to the confluence of Big and Little Sandy Creeks in Jasper in Jasper County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Lower 11.5 miles	D

SegID: **0604 Neches River Below Lake Palestine**
Water body location: From a point immediately upstream of the confluence of Hopson Mill Creek in Jasper/Tyler County to Blackburn Crossing Dam in Anderson/Cherokee County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	lead (chronic) in water	Cherokee County line to Anderson County line	D

SegID: **0604A Cedar Creek (unclassified water body)**
Water body location: From the confluence of the Neches River southwest of Lufkin in Angelina County to the upstream perennial portion of the stream in Lufkin in Angelina County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Upper area upstream of FM 2497	D

SegID: **0604B Hurricane Creek (unclassified water body)**
Water body location: From the confluence of Cedar Creek south of Lufkin in Angelina County to the upstream perennial portion of the stream in Lufkin in Angelina County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Lower 2 miles	D
5c	bacteria	Upper 2 miles	D

SegID: **0604C Jack Creek (unclassified water body)**
Water body location: From the confluence of Cedar Creek southwest of Lufkin in Angelina County to the upstream perennial portion of the stream in northeast Lufkin in Angelina County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Lower 8 miles	D
5c	bacteria	Upper 8 miles	D

SegID: **0604T Lake Ratcliff (unclassified water body)**
Water body location: Lake in Houston County 3.4 miles northeast of Kennard
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	mercury in fish tissue	Entire lake	M

SegID: **0605A Kickapoo Creek (unclassified water body)**
Water body location: From the confluence of Lake Palestine east of Brownsboro in Henderson County to the upstream perennial portion of the stream northeast of Murchinson in Henderson County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Downstream of FM 1803	D

SegID: **0606 Neches River Above Lake Palestine**
Water body location: From a point 6.7 km (4.2 miles) downstream of FM 279 in Henderson/Smith County to Rhines Lake Dam in Van Zandt County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	low pH	Prairie Creek to river mile 7.0	D
5c	zinc (acute) in water	Prairie Creek to river mile 7.0	D
5c	zinc (chronic) in water	Prairie Creek to river mile 7.0	D

SegID: **0606A Prairie Creek (unclassified water body)**
Water body location: From the confluence of the Neches River west of Tyler in Smith County to the upstream perennial portion of the stream south of Lindale in Smith County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Lower 4 miles	D

SegID: **0607 Pine Island Bayou**
Water body location: From the confluence with the Neches River in Hardin/Jefferson County to FM 787 in Hardin County
Overall Category: **5b**

Category	Parameter	Area	Rank
5b	depressed dissolved oxygen	Mouth to river mile 5.7	S
5b	depressed dissolved oxygen	River Mile 12.1 to mile 21.5	S
5b	depressed dissolved oxygen	River Mile 21.5 to mile 46.5	S
5b	depressed dissolved oxygen	River Mile 46.5 to headwaters	S
5b	depressed dissolved oxygen	River Mile 5.7 to mile 12.1	S

SegID: **0607A Boggy Creek (unclassified water body)**
Water body location: From the confluence of Pine Island Bayou south of Lumberton in Hardin County to the upstream perennial portion of the stream west of Lumberton in Hardin County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	Entire creek	D

SegID: **0607B Little Pine Island Bayou (unclassified water body)**
Water body location: From the confluence of Pine Island Bayou southwest of Lumberton in Hardin County to the upstream perennial portion of the stream west of Kountze in Hardin County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	Lower 25 miles	D

SegID: **0607C Willow Creek (unclassified water body)**
Water body location: From the confluence of Pine Island Bayou north of Nome in Jefferson County to the upstream perennial portion of the stream east of Devers in Liberty County
Overall Category: **5b**

Category	Parameter	Area	Rank
5b	depressed dissolved oxygen	Entire creek	S

SegID: **0608 Village Creek**
Water body location: From the confluence with the Neches River in Hardin County to Lake Kimble Dam in Hardin County
Overall Category: **5b**

Category	Parameter	Area	Rank
5b	low pH	From FM 418 to Lake Kimble dam	S

SegID: **0608A Beech Creek (unclassified water body)**
Water body location: From the confluence of Village Creek northeast of Kountze in Hardin County to the upstream perennial portion of the stream southeast of Woodville in Tyler County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	Lower 20 miles of water body	D
5c	depressed dissolved oxygen	Upper 19 miles of water body	D

SegID: **0608B Big Sandy Creek (unclassified water body)**
Water body location: From the confluence of Village Creek northwest of Kountze in Hardin County to the upstream perennial portion of the stream northeast of Livingston in Polk County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Lower 30 miles downstream of US 190	D
5c	bacteria	Upper 16.9 miles of segment	D

SegID: **0608C Cypress Creek (unclassified water body)**
Water body location: From the confluence of Village Creek east of Kountze in Hardin County to the upstream perennial portion of the stream northwest of Kountze in Hardin County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	Entire water body	D

SegID: **0608F Turkey Creek (unclassified water body)**
Water body location: From the confluence of Village Creek north of Kountze in Hardin County to the upstream perennial portion of the stream southeast of Woodville in Tyler County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Lower 25 miles of segment	D

SegID: **0608G Lake Kimball (unclassified water body)**
Water body location: From Kimble Creek Dam northwest of Kountze in Hardin County to normal pool elevation in Tyler County (impounds Kimble and Village Creeks)
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	mercury in fish tissue	Entire lake	M

SegID: **0610 Sam Rayburn Reservoir**
Water body location: From Sam Rayburn Dam in Jasper County to a point 5.6 kilometers (3.5 miles) upstream of Marion's Ferry on the Angelina River Arm in Angelina/Nacogdoches County and to a point 3.9 km (2.4 miles) downstream of Curry Creek on the Attoyac Bayou Arm in Nacogdoches/San Augustine County, up to the normal pool elevation of 164 ft (except on the Angelina River Arm) (impounds Angelina River and Attoyac Bayou)
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	mercury in largemouth bass and freshwater drum	Bear Creek arm	M
5a	mercury in largemouth bass and freshwater drum	Extreme upper Angelina River arm	M
5a	mercury in largemouth bass and freshwater drum	Lower Angelina River arm	M
5c	depressed dissolved oxygen	Lower Attoyac Bayou arm	D
5a	mercury in largemouth bass and freshwater drum	Lower Attoyac Bayou arm	M
5a	mercury in largemouth bass and freshwater drum	Lower Ayish Bayou arm	M

5a	mercury in largemouth bass and freshwater drum	Main pool by the dam	M
5a	mercury in largemouth bass and freshwater drum	Mid-Angelina River arm (SH 147)	M
5b	aluminum in water	Upper Angelina River arm	S
5c	depressed dissolved oxygen	Upper Angelina River arm	D
5a	mercury in largemouth bass and freshwater drum	Upper Angelina River arm	M
5a	mercury in largemouth bass and freshwater drum	Upper Attoyac Bayou arm	M
5c	depressed dissolved oxygen	Upper Ayish Bayou arm	D
5a	mercury in largemouth bass and freshwater drum	Upper Ayish Bayou arm	M
5c	depressed dissolved oxygen	Upper mid-Angelina River arm	D
5a	mercury in largemouth bass and freshwater drum	Upper mid-Angelina River arm	M

SegID: **0610A Ayish Bayou (unclassified water body)**
Water body location: From the confluence of Sam Rayburn Reservoir south of San Augustine in San Augustine County to the upstream perennial portion of the stream north of San Augustine in San Augustine County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Middle portion from US 96 to SH 21	D
5c	bacteria	Upper portion from SH 21 to headwaters	D

SegID: **0611 Angelina River Above Sam Rayburn Reservoir**
Water body location: From the aqueduct crossing 1.0 km (0.6 miles) upstream of the confluence of Paper Mill Creek in Angelina/Nacogdoches County to the confluence of Barnhardt Creek and Mill Creek at FM 225 in Rusk County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	FM 343 to US 84	D

SegID: **0611A East Fork Angelina River (unclassified water body)**
Water body location: From the confluence of the Angelina River at the Rusk/Nacogdoches county line to the upstream perennial portion of the stream west of Mount Enterprise in Rusk County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Confluence with Grassy Lake area	D
5c	lead (chronic) in water	Confluence with Grassy Lake area	D
5c	lead in water	Confluence with Grassy Lake area	D
5c	lead (chronic) in water	County road near Happy Valley to Wotten Creek	D
5c	lead in water	County road near Happy Valley to Wotten Creek	D

5c	lead (chronic) in water	Grassy Lake area to county road near Happy Valley	D
5c	lead in water	Grassy Lake area to county road near Happy Valley	D
5c	lead (chronic) in water	Wotten Creek to headwaters	D
5c	lead in water	Wotten Creek to headwaters	D

SegID: **0611B La Nana Bayou (unclassified water body)**
Water body location: From the confluence of the Angelina River south of Nacogdoches in Nacogdoches County to the upstream perennial portion of the stream north of Nacogdoches in Nacogdoches County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Mouth to unimproved road near FM 3228/1275	D
5c	bacteria	Unimproved road near FM 3228/ 1275 to SH 7	D

SegID: **0611C Mud Creek (unclassified water body)**
Water body location: From the confluence of the Angelina River east of Rusk in Cherokee County to the upstream perennial portion of the stream west of Troup in Smith County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Lower portion of water body	D

SegID: **0612B Waffelow Creek (unclassified water body)**
Water body location: From the confluence of Attoyac Bayou north of Martinsville in Nacogdoches County to the upstream perennial portion of the stream northeast of Nacogdoches in Nacogdoches County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Lower portion downstream of CR 234	D
5c	bacteria	Upper portion upstream of CR 234	D

SegID: **0613 Lake Tyler/Lake Tyler East**
Water body location: From Whitehouse Dam and Mud Creek Dam in Smith County up to the normal pool elevation of 375.38 feet (impounds Prairie Creek and Mud Creek)
Overall Category: **5b**

Category	Parameter	Area	Rank
5b	low pH	Lake Tyler East upper reservoir	S

SegID: **0615 Angelina River/Sam Rayburn Reservoir**
Water body location: The riverine portion of Sam Rayburn Reservoir from a point 5.6 kilometers (3.5 miles) upstream of Marion's Ferry to a point 2.75 kilometers (1.71 miles) upstream of the confluence of Paper Mill Creek
Overall Category: **5a**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	Downstream of Papermill Creek	D
5a	impaired fish community	Downstream of Papermill Creek	H

5a	mercury in largemouth bass and freshwater drum	Downstream of Papermill Creek	M
5c	depressed dissolved oxygen	Upstream of Papermill Creek	D
5a	mercury in largemouth bass and freshwater drum	Upstream of Papermill Creek	M

SegID: **0701 Taylor Bayou Above Tidal**
Water body location: From the saltwater lock 7.7 km (4.8 miles) downstream of SH 73 in Jefferson County to the Lower Neches Valley Authority Canal in Jefferson County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	Lower 8 miles of segment	D
5c	depressed dissolved oxygen	Portion 7 mi downstream of the confluence of N and S Forks Taylor Bayou	D

SegID: **0702A Alligator Bayou (unclassified water body)**
Water body location: From the Alligator Bayou pump station at the Jefferson County hurricane protection levee one mile downstream of Spur 215 in Port Arthur to a point immediately upstream of the confluence with Jefferson county Drainage District No. 7 city outfall canal
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	ambient toxicity in sediment	Entire water body	D
5c	ambient toxicity in water	Entire water body	D
5c	impaired fish community	Entire water body	D

SegID: **0704 Hillebrandt Bayou**
Water body location: From the confluence of Taylor Bayou in Jefferson County to a point 100 meters (110 yards) upstream of SH 124 in Jefferson County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	From confluence with Bayou Din to upper end of segment	D
5c	depressed dissolved oxygen	From confluence with Taylor Bayou to confluence with Bayou Din	D

SegID: **0803 Lake Livingston**
Water body location: From Livingston Dam in Polk/San Jacinto County to a point 1.8 km (1.1 miles) upstream of Boggy Creek in Houston/Leon County, up to normal pool elevation of 131 feet (impounds Trinity River)
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	Cove off upper portion of reservoir, East Trinity	D
5c	depressed dissolved oxygen	Lower portion of reservoir, East Willow Springs	D
5c	depressed dissolved oxygen	Lower portion of reservoir, East Wolf Creek	D

5c	depressed dissolved oxygen	Lowermost portion of reservoir, adjacent to dam	D
5c	depressed dissolved oxygen	Middle portion of reservoir, East Pointblank	D
5c	depressed dissolved oxygen	Middle portion of reservoir, downstream of Kickapoo Creek	D
5c	depressed dissolved oxygen	Upper portion of reservoir, centering on SH 19	D
5c	depressed dissolved oxygen	Upper portion of reservoir, west of Carlisle	D
5c	high pH	Upper portion of reservoir, west of Carlisle	D

SegID: **0805 Upper Trinity River**
Water body location: From a point immediately upstream of the confluence of the Cedar Creek Reservoir discharge canal in Henderson/Navarro County to a point immediately upstream of the confluence of Elm Fork Trinity River in Dallas County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	PCBs in fish tissue	11 mile reach near S. Loop 12	H
5c	bacteria	11 mile reach near S. Loop 12	D
5c	bacteria	25 mile reach near SH 34	D
5c	bacteria	Remainder of segment	D
5a	PCBs in fish tissue	Upper 8 miles	H
5c	bacteria	Upper 8 miles	D

SegID: **0806 West Fork Trinity River Below Lake Worth**
Water body location: From a point immediately upstream of the confluence of Village Creek in Tarrant County to Lake Worth Dam in Tarrant County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	PCBs in fish tissue	Lower 22 miles of the segment	H
5c	bacteria	Lower 22 miles of the segment	D

SegID: **0807 Lake Worth**
Water body location: From Lake Worth Dam in Tarrant County to a point 4.0 km (2.5 miles) downstream of Eagle Mountain Dam in Tarrant County, up to normal pool elevation of 594.3 feet (impounds West Fork Trinity River)
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	PCBs in fish tissue	Entire reservoir	H

SegID: **0810 West Fork Trinity River Below Bridgeport Reservoir**
Water body location: From a point 0.6 km (0.4 miles) downstream of the confluence of Oates Branch in Wise County to Bridgeport Dam in Wise County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Lower 25 miles of segment	D

SegID: **0812 West Fork Trinity River Above Bridgeport Reservoir**
Water body location: From a point immediately upstream of the confluence of Bear Hollow in Jack County to SH 79 in Archer County
Overall Category: **5b**

Category	Parameter	Area	Rank
5b	chloride	Lower 25 miles of segment	S
5b	depressed dissolved oxygen	Lower 25 miles of segment	S
5b	total dissolved solids	Lower 25 miles of segment	S
5b	chloride	Upper 60 miles of segment	S
5b	total dissolved solids	Upper 60 miles of segment	S

SegID: **0814 Chambers Creek Above Richland-Chambers Reservoir**
Water body location: From a point 4.0 km (2.5 miles) downstream of Tupelo Branch in Navarro County to the confluence of North Fork Chambers Creek and South Fork Chambers Creek
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	From confluence with Cummins Creek to a point 16.5 miles upstream	D

SegID: **0818 Cedar Creek Reservoir**
Water body location: From Joe B. Hoggsett Dam in Henderson County up to normal pool elevation of 322 feet (impounds Cedar Creek)
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	high pH	Caney Creek cove	D
5c	high pH	Clear Creek cove	D
5c	high pH	Cove off lower portion of reservoir adjacent to Clearview Estates	D
5c	high pH	Lower portion of reservoir east of Key Ranch Estates	D
5c	high pH	Lowermost portion of reservoir adjacent to dam	D
5c	high pH	Middle portion of reservoir downstream of Twin Creeks cove	D
5c	high pH	Twin Creeks cove	D
5c	high pH	Upper portion of reservoir adjacent to Lacy Fork cove	D
5c	high pH	Upper portion of reservoir east of Tolosa	D
5c	high pH	Uppermost portion of reservoir downstream of Kings Creek	D

SegID: **0819 East Fork Trinity River**
Water body location: From the confluence with the Trinity River in Kaufman County to Rockwall-Forney Dam in Kaufman County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire segment	D

SegID: **0820C Muddy Creek (unclassified water body)**
Water body location: From the confluence with Lake Ray Hubbard, in Dallas County, to the headwaters east of Allen, in Collin County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire creek	D

SegID: **0823A Little Elm Creek (unclassified water body)**
Water body location: Perennial stream from FM 455 in Collin County up to 1.4 km above FM 121 in Grayson County near Gunter
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire creek	D

SegID: **0824 Elm Fork Trinity River Above Ray Roberts Lake**
Water body location: From a point 9.5 km (5.9 miles) downstream of the confluence of Pecan Creek in Cooke County to US 82 in Montague County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Lower 7.5 miles of segment	D

SegID: **0829 Clear Fork Trinity River Below Benbrook Lake**
Water body location: From the confluence with the West Fork Trinity River in Tarrant County to Benbrook Dam in Tarrant County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	PCBs in fish tissue	Lower mile of segment	H

SegID: **0831 Clear Fork Trinity River Below Lake Weatherford**
Water body location: From a point 200 meters (220 yards) downstream of US 377 in Tarrant County to Weatherford Dam in Parker County
Overall Category: **5b**

Category	Parameter	Area	Rank
5c	bacteria	Upper 6.25 miles, upstream from South Fork Trinity River confluence	D
5b	depressed dissolved oxygen	Upper 6.25 miles, upstream from South Fork Trinity River confluence	S

SegID: **0833 Clear Fork Trinity River Above Lake Weatherford**
Water body location: From a point 3.1 km (1.9 miles) upstream of FM 1707 in Parker County, to FM 3107 in Parker County
Overall Category: **5b**

Category	Parameter	Area	Rank
5b	depressed dissolved oxygen	Lower 11 miles of segment	S
5b	depressed dissolved oxygen	Upper 11 miles of segment	S

SegID: **0836 Richland-Chambers Reservoir**
Water body location: From Richland-Chambers Dam in Freestone County to the confluence of Pin Oak Creek on the Richland Creek Arm in Navarro County and to a point 4.0 km (2.5 miles) downstream of Tupelo Branch on the Chambers Creek Arm in Navarro County, up to normal pool elevation of 315 feet (impounds Richland and Chambers Creeks)
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	high pH	Lower portion of Chambers Creek arm	D

SegID: **0841 Lower West Fork Trinity River**
Water body location: From a point immediately upstream of the confluence of the Elm Fork Trinity River in Dallas County to a point immediately upstream of the confluence of Village Creek in Tarrant County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	PCBs in fish tissue	Lower 14 miles of segment	H
5c	bacteria	Lower 14 miles of segment	D
5a	PCBs in fish tissue	Upper 13 miles of segment	H
5c	bacteria	Upper 13 miles of segment	D

SegID: **0901 Cedar Bayou Tidal**
Water body location: From the confluence with Galveston Bay 1.0 km (0.6 miles) downstream of Tri-City Beach Road in Chambers County to a point 2.2 km (1.4 miles) upstream of IH 10 in Chambers/Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	dioxin in catfish and crab tissue	Entire segment	H

SegID: **0902 Cedar Bayou Above Tidal**
Water body location: From a point 2.2 km (1.4 miles) upstream of IH 10 in Chambers/Harris County to a point 7.4 km (4.6 miles) upstream of FM 1960 in Liberty County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	Entire segment	D

SegID: **1001 San Jacinto River Tidal**
Water body location: From a point 100 meters (110yards) downstream of IH 10 in Harris County to Lake Houston Dam in Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	dioxin in catfish and crab tissue	From Lake Houston Dam to US Hwy 90	H
5a	PCBs in fish tissue	From US Hwy 90 to downstream of IH 10	H
5a	dioxin in catfish and crab tissue	From US Hwy 90 to downstream of IH 10	H
5a	pesticides in fish tissue	From US Hwy 90 to downstream of IH 10	H

SegID: **1004 West Fork San Jacinto River**
Water body location: From the confluence of Spring Creek in Harris/Montgomery County to Conroe Dam in Montgomery County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	IH 45 to a point 10 miles downstream	D

SegID: **1005 Houston Ship Channel/San Jacinto River Tidal**
Water body location: From the confluence with Galveston Bay at Morgan's Point in Harris/Chambers County to a point 100 meters (110 yards) downstream of IH 10 in Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	PCBs in fish tissue	Downstream I-10 to Lynchburg Ferry Road	H
5a	dioxin in catfish and crab tissue	Downstream I-10 to Lynchburg Ferry Road	H
5a	pesticides in fish tissue	Downstream I-10 to Lynchburg Ferry Road	H
5a	dioxin in catfish and crab tissue	Goose Island to SH 146	H
5a	dioxin in catfish and crab tissue	Lynchburg Ferry Road to Goose Island	H
5a	dioxin in catfish and crab tissue	SH 146 to Morgans Point	H

SegID: **1006 Houston Ship Channel Tidal**
Water body location: From the confluence with the San Jacinto River in Harris County to a point immediately upstream of Greens Bayou in Harris County, including tidal portions of tributaries
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	PCBs in fish tissue	Goodyear Creek Tidal	H
5a	dioxin in catfish and crab tissue	Goodyear Creek Tidal	H
5a	pesticides in fish tissue	Goodyear Creek Tidal	H
5a	PCBs in fish tissue	Greens Bayou Tidal	H
5a	dioxin in catfish and crab tissue	Greens Bayou Tidal	H
5a	pesticides in fish tissue	Greens Bayou Tidal	H
5a	PCBs in fish tissue	Houston Ship Channel Tidal	H
5a	dioxin in catfish and crab tissue	Houston Ship Channel Tidal	H
5a	pesticides in fish tissue	Houston Ship Channel Tidal	H
5a	PCBs in fish tissue	Patrick Bayou Tidal	H
5c	chronic toxicity in sediment	Patrick Bayou Tidal	D
5a	dioxin in catfish and crab tissue	Patrick Bayou Tidal	H
5a	pesticides in fish tissue	Patrick Bayou Tidal	H

SegID: **1006D Halls Bayou Below US 59 (unclassified water body)**
Water body location: Perennial stream from the confluence with Greens Bayou up to US 59 in Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	From US 59 to Hirsch Road	M
5a	bacteria	Tidwell Road to confluence with Greens Bayou	M

SegID: **1006E Halls Bayou Above US 59 (unclassified water body)**
Water body location: Perennial stream from US 59 upstream to Frick Road
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire stream reach	M

SegID: **1006F Big Gulch Above Tidal (unclassified water body)**
Water body location: From the confluence with Greens Bayou Tidal to Wallisville Road in Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire stream	M

SegID: **1006H Spring Gully Above Tidal (unclassified water body)**
Water body location: From confluence with Greens Bayou to US 90 in Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire stream	M

SegID: **1006I Unnamed Tributary of Halls Bayou (unclassified water body)**
Water body location: From the confluence with Halls Bayou to a point 0.13 miles upstream of Richland Drive in Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	From Woodlynn Drive to confluence with Halls Bayou	M
5a	bacteria	From headwaters to Woodlynn Drive	M

SegID: **1006J Unnamed Tributary of Halls Bayou (unclassified water body)**
Water body location: From the confluence of Halls Bayou (east of US 59 and south of Langley Road) to Mount Houston Road in Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire stream	M

SegID: **1007 Houston Ship Channel/Buffalo Bayou Tidal**
Water body location: From a point immediately upstream of Greens Bayou in Harris County to a point 100 meters (110 yards) upstream of US 59 in Harris County, including tidal portion of tributaries
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	PCBs in fish tissue	Berry Bayou Tidal	H
5a	dioxin in catfish and crab tissue	Berry Bayou Tidal	H
5a	pesticides in fish tissue	Berry Bayou Tidal	H
5a	PCBs in fish tissue	Brays Bayou Tidal	H
5a	dioxin in catfish and crab tissue	Brays Bayou Tidal	H
5a	pesticides in fish tissue	Brays Bayou Tidal	H
5a	PCBs in fish tissue	Houston Ship Channel/Buffalo Bayou Tidal	H
5a	dioxin in catfish and crab tissue	Houston Ship Channel/Buffalo Bayou Tidal	H
5a	pesticides in fish tissue	Houston Ship Channel/Buffalo Bayou Tidal	H
5a	PCBs in fish tissue	Hunting Bayou Tidal	H
5a	dioxin in catfish and crab tissue	Hunting Bayou Tidal	H
5a	pesticides in fish tissue	Hunting Bayou Tidal	H
5a	PCBs in fish tissue	Sims Bayou Tidal	H
5a	dioxin in catfish and crab tissue	Sims Bayou Tidal	H
5a	pesticides in fish tissue	Sims Bayou Tidal	H
5a	PCBs in fish tissue	Vince Bayou Tidal	H
5c	acute toxicity in sediment	Vince Bayou Tidal	D
5a	dioxin in catfish and crab tissue	Vince Bayou Tidal	H
5a	pesticides in fish tissue	Vince Bayou Tidal	H

SegID: **1007B Brays Bayou Above Tidal (unclassified water body)**
Water body location: Perennial stream from 11.5 km upstream of confluence with Houston Ship Channel up to SH 6
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire stream	M

SegID: **1007C Keegans Bayou Above Tidal (unclassified water body)**
Water body location: Perennial stream from confluence with Brays Bayou upstream to Harris County line
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	From Harris County line to confluence with Brays Bayou	M

SegID: **1007D Sims Bayou Above Tidal (unclassified water body)**
Water body location: Perennial stream from 11.0 km upstream of confluence with Houston Ship Channel upstream to Hiram Clark Drive
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire stream	M

SegID: **1007E Willow Waterhole Bayou Above Tidal (unclassified water body)**
Water body location: Perennial stream from confluence with Brays Bayou upstream to South Garden (in Missouri City)
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire stream	M

SegID: **1007F Berry Bayou Above Tidal (unclassified water body)**
Water body location: Perennial stream from 2.4 km upstream from the confluence with Sims Bayou to the southern city limits of South Houston
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	1.5 miles upstream from confluence with Sims Bayou to SH 3	M

SegID: **1007G Kuhlman Gully Above Tidal (unclassified water body)**
Water body location: From confluence with Brays Bayou in Harris County to Atchison, Topeka and Santa Fe Railroad tracks in Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire stream	M

SegID: **1007H Pine Gully Above Tidal (unclassified water body)**
Water body location: From the confluence with Sims Bayou in Harris County to Broadway in Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire stream	M
5c	depressed dissolved oxygen	Entire stream	D

SegID: **1007I Plum Creek Above Tidal (unclassified water body)**
Water body location: From the confluence with Sims Bayou in Harris County to Telephone Road in Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire stream	M
5c	depressed dissolved oxygen	Entire stream	D

SegID: **1007K Country Club Bayou Above Tidal (unclassified water body)**
Water body location: From the confluence with Brays Bayou to approximately 0.5 miles upstream of North Wayside Drive in Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	From North Wayside Drive to the confluence with Brays Bayou	M
5c	depressed dissolved oxygen	From North Wayside Drive to the confluence with Brays Bayou	D
5a	bacteria	From the headwaters to North Wayside Drive	M
5c	depressed dissolved oxygen	From the headwaters to North Wayside Drive	D

SegID: **1007L Unnamed Non-Tidal Tributary of Brays Bayou (unclassified water body)**
Water body location: From the confluence with Brays Bayou near Fondren Road to a point 0.60 miles upstream in Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire perennial portion of stream	M

SegID: **1007M Unnamed Non-Tidal Tributary of Hunting Bayou (unclassified water body)**
Water body location: From the confluence with Hunting Bayou to Mercury Road in Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire stream	M

SegID: **1007N Unnamed Non-Tidal Tributary of Sims Bayou (unclassified water body)**
Water body location: From confluence with Sims Bayou, south of Airport Road, to Reed Road, east of SH 288 in Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire stream	M

SegID: **1007O Unnamed Non-Tidal Tributary of Buffalo Bayou (unclassified water body)**
Water body location: From confluence with Buffalo Bayou to IH-10 between Hirsch Road and Lockwood in Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire stream	M
5c	depressed dissolved oxygen	Entire stream	D

SegID: **1007P Brays Bayou Above Tidal (unclassified water body)**
Water body location: From Alief Clodine Road to SH 6 in Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	From Alief Clodine Road to SH 6	M

SegID: **1007Q Sims Bayou Above Tidal (unclassified water body)**
Water body location: From Hiram Clark Drive to south of West Orem Road in Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	From South Post Oak to Tiffany Drive	M
5a	bacteria	From Tiffany Drive to Hiram Creek	M
5a	bacteria	From just south of West Orem Road to South Post Oak	M
5c	depressed dissolved oxygen	From just south of West Orem Road to South Post Oak	D

SegID: **1007R Hunting Bayou Above Tidal (unclassified water body)**
Water body location: From the confluence with Hunting Bayou Tidal at IH-10 to Maury Street on the north fork and Bain Street on the south fork
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	From Bains Street to Sayers Street (South Fork)	M
5c	depressed dissolved oxygen	From Bains Street to Sayers Street (South Fork)	D
5a	bacteria	From Falls Street to Loop 610 (South of US 90A)	M
5a	bacteria	From Loop 610 to IH 10	M

SegID: **1008 Spring Creek**
Water body location: From the confluence with the West Fork San Jacinto River in Harris/Montgomery County to the most upstream crossing of FM 1736 in Waller County
Overall Category: **5b**

Category	Parameter	Area	Rank
5b	depressed dissolved oxygen	Field Store Road to SH 249	S
5c	bacteria	IH 45 to confluence with Lake Houston	D

SegID: **1009 Cypress Creek**
Water body location: From the confluence with Spring Creek in Harris County to the confluence of Snake Creek and Mound Creek in Waller County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	IH 45 to confluence with Spring Creek	D
5c	bacteria	SH 249 to IH 45	D
5c	bacteria	US 290 to SH 249	D
5c	bacteria	Upper portion of segment to downstream of US 290	D

SegID: **1013 Buffalo Bayou Tidal**
Water body location: From a point 100 meters (110 yards) upstream of US 59 in Harris County to a point 400 meters (440 yards) upstream of Shepard Drive in Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire segment	L
5c	copper (chronic) in water	Entire segment	D

SegID: **1013A Little White Oak Bayou (unclassified water body)**
Water body location: Perennial stream from the confluence with Whiteoak Bayou up to RR tracks north of IH 610
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	From RR tracks north of IH 610 to Trimble St	M
5c	depressed dissolved oxygen	From RR tracks north of IH 610 to Trimble St	D
5a	bacteria	From Trimble St to confluence with White Oak Bayou	M

SegID: **1013C Unnamed Non-Tidal Tributary of Buffalo Bayou Tidal (unclassified water body)**
Water body location: Located approximately 1.8 miles upstream of the Buffalo Bayou/White Oak Bayou confluence between IH 10 and Memorial Drive west of IH-45 in Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire stream	M

SegID: **1014 Buffalo Bayou Above Tidal**
Water body location: From a point 400 meters (440 yards) upstream of Shepherd Drive in Harris County to SH 6 in Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire segment	L

SegID: **1014H South Mayde Creek (unclassified water body)**
Water body location: Perennial stream in the Addicks Reservoir flood pool area, from the confluence with Buffalo Bayou upstream to the confluence with an unnamed tributary 0.62 km east of Barker-Cypress Road
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire stream	M

SegID: **1014K Turkey Creek (unclassified water body)**
Water body location: Perennial stream from the confluence with South Mayde Creek in Harris County upstream to the headwaters south of Clay Road in Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire stream	M

SegID: **1014M Neimans Bayou (unclassified water body)**
Water body location: From confluence with Buffalo Bayou Above Tidal to upstream of IH 10
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire stream	M
5c	depressed dissolved oxygen	Entire stream	D

SegID: **1014N Rummel Creek (unclassified water body)**
Water body location: From confluence with Buffalo Bayou Above Tidal in Harris County to IH 10/Beltway 8 in Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire stream	M

SegID: **1014O Spring Branch (unclassified water body)**
Water body location: From confluence with Buffalo Bayou in Harris County to Blalock Road in Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire stream	M

SegID: **1016 Greens Bayou Above Tidal**
Water body location: From a point 0.7 km (0.4 miles) above the confluence of Halls Bayou in Harris County to a point 100 meters (110 yards) above FM 1960 in Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	IH 45 to US 59	L
5a	bacteria	Upstream FM 1960 to IH 45	L

SegID: **1016A Garners Bayou (unclassified water body)**
Water body location: Perennial stream from the confluence with Williams Gully upstream to 1.5 km north of Atoscocita Road
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	From Williams Gully confluence to confluence with Greens Bayou	M
5a	bacteria	From a point adjacent to Vegas Road to Williams Gully confluence	M

SegID: **1016B Unnamed Tributary of Greens Bayou (unclassified water body)**
Water body location: From confluence with Greens Bayou to Hirsch Road in Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire stream	M

SegID: **1016C Unnamed Tributary of Greens Bayou (unclassified water body)**
Water body location: From the confluence with Greens Bayou, east of Aldine Westfield Road, to the Hardy Toll Road in Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire stream	M

SegID: **1016D Unnamed Tributary of Greens Bayou (unclassified water body)**
Water body location: From confluence with Greens Bayou, west of El Dorado Country Club to Lee Road, west of US Hwy 59 in Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire stream	M
5c	depressed dissolved oxygen	Entire stream	D

SegID: **1017 Whiteoak Bayou Above Tidal**
Water body location: From a point immediately upstream of the confluence of Little White Oak Bayou in Harris County to a point 3.0 km (1.9 miles) upstream of FM 1960 in Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire segment	L

SegID: **1017A Brickhouse Gully/Bayou (unclassified water body)**
Water body location: Perennial stream from the confluence with Whiteoak Bayou up to Gessner Road
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire stream	M

SegID: **1017B Cole Creek (unclassified water body)**
Water body location: Perennial stream from the confluence with White Oak Bayou up to south of Beltway 8
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	From Flintlock Street to confluence with White Oak Bayou	M

SegID: **1017D Unnamed Tributary of White Oak Bayou (unclassified water body)**
Water body location: From confluence with White Oak Bayou downstream of TC Jester, to Hempstead Hwy, north of US Hwy 290 in Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire stream	M
5c	depressed dissolved oxygen	Entire stream	D

SegID: **1017E Unnamed Tributary of White Oak Bayou (unclassified water body)**
Water body location: From the confluence with White Oak Bayou, near W 11th Street, to just upstream of W 26th Street, south of Loop 610 W in Harris County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire stream	M

SegID: **1101 Clear Creek Tidal**
Water body location: From the confluence with Clear Lake at a point 3.2 km (2.0 miles) downstream of El Camino Real in Galveston/Harris County to a point 100 m (110 yards) upstream of FM528 in Galveston/Harris County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Downstream of SH 3 to confluence with Clear Lake	D
5c	bacteria	IH 45 to SH 3	D
5c	bacteria	Upstream of FM 528 to IH 45	D

SegID: **1101B Chigger Creek (unclassified water body)**
Water body location: From the confluence of Clear Creek Tidal to the Brazos River Authority Canal near CR 143 in Galveston County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	FM 528 to the confluence with Clear Creek	D
5c	bacteria	From the headwaters to FM 528	D

SegID: **1102 Clear Creek Above Tidal**
Water body location: From a point 100 meters (110 yards) upstream of FM 528 in Galveston/Harris County to Rouen Road in Fort Bend County
Overall Category: **5a**

Category	Parameter	Area	Rank
5c	bacteria	FM 1959 to upstream of FM 528	D
5a	chloride	FM 1959 to upstream of FM 528	H
5a	total dissolved solids	FM 1959 to upstream of FM 528	H
5c	bacteria	SH 35 to FM 1959 (Dixie Farm Road)	D
5a	chloride	SH 35 to FM 1959 (Dixie Farm Road)	H
5a	total dissolved solids	SH 35 to FM 1959 (Dixie Farm Road)	H
5c	bacteria	Upper segment boundary to SH 35	D
5a	chloride	Upper segment boundary to SH 35	H
5a	total dissolved solids	Upper segment boundary to SH 35	H

SegID: **1102A Cowart Creek (unclassified water body)**
Water body location: Intermittent stream with perennial pools from the confluence with Clear Creek in Galveston County to SH 35 in Brazoria County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire stream	D

SegID: **1102B Mary's Creek/ North Fork Mary's Creek (unclassified water body)**
Water body location: Perennial stream from the confluence with Clear Creek upstream to the confluence with North Fork Mary's Creek and South Fork Mary's Creek near FM 1128, approximately 5 km southwest of Pearland. Includes perennial portions of North Fork Mary's Creek from the confluence to Mary's Creek to the confluence of an unnamed tributary approximately 3.2 km upstream of FM 1128
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire stream	D

SegID: **1103 Dickinson Bayou Tidal**
Water body location: From the confluence with Dickinson Bay 2.1 km (1.3 miles) downstream of SH 146 in Galveston County to a point 4.0 km (2.5 miles) downstream of FM 517 in Galveston County
Overall Category: **5a**

Category	Parameter	Area	Rank
5c	bacteria	Arcadia Cemetery Road to IH 45	D
5c	depressed dissolved oxygen	Arcadia Cemetery Road to IH 45	D
5c	bacteria	Benson Bayou confluence to SH 3	D
5a	depressed dissolved oxygen	Benson Bayou confluence to SH 3	M
5c	bacteria	IH 45 to Benson Bayou confluence	D
5c	depressed dissolved oxygen	IH 45 to Benson Bayou confluence	D
5c	bacteria	Upper segment boundary to Arcadia Cemetery Road	D
5c	depressed dissolved oxygen	Upper segment boundary to Arcadia Cemetery Road	D

SegID: **1103A Bensons Bayou (unclassified water body)**
Water body location: From the confluence with Dickinson Bayou Tidal to 0.37 miles upstream of FM 646 in Galveston County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire stream	D

SegID: **1103B Bordens Gully (unclassified water body)**
Water body location: From confluence with Dickinson Bayou Tidal to upstream of Calder Road in Galveston County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire stream	D

SegID: **1103C Geisler Bayou (unclassified water body)**
Water body location: From confluence with Dickinson Bayou tidal to IH 45 in Galveston County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire stream	D

SegID: **1103D Gum Bayou (unclassified water body)**
Water body location: From confluence with Dickinson Bayou to FM 3436 in Galveston County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire stream	D

SegID: **1104 Dickinson Bayou Above Tidal**
Water body location: From a point 4.0 km (2.5 miles) downstream of FM 517 in Galveston County to FM 528 in Galveston County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire segment	D

SegID: **1110 Oyster Creek Above Tidal**
Water body location: From a point 100 meters (110 yards) upstream of FM 2004 in Brazoria County to the Brazos River Authority diversion dam 1.8 km (1.1 miles) upstream of SH 6 in Fort Bend County
Overall Category: **5b**

Category	Parameter	Area	Rank
5b	depressed dissolved oxygen	From just upstream of Ramsey Prison Unit (Cow Cr) to CR 290/S Walker St.	S

SegID: **1113 Armand Bayou Tidal**
Water body location: From the confluence with Clear Lake (at NASA Road 1 bridge) in Harris County to a point 0.8 km (0.5 miles) downstream of Genoa-Red Bluff road in Pasadena in Harris County (includes Mud Lake)
Overall Category: **5b**

Category	Parameter	Area	Rank
5c	bacteria	Entire stream	D
5b	depressed dissolved oxygen	Entire stream	S

SegID: **1113A Armand Bayou Above Tidal (unclassified water body)**
Water body location: From a point 0.8 km (0.5 miles) downstream of Genoa-Red Bluff Road in Pasadena in Harris County
Overall Category: **5b**

Category	Parameter	Area	Rank
5b	depressed dissolved oxygen	Upper segment boundary to Bay Area Blvd.	S

SegID: **1202H Allen's Creek (unclassified water body)**
Water body location: From the confluence with the Brazos River, two miles northeast of Wallis, to the headwaters one mile north of IH 10 in Austin County.
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire water body	D

SegID: **1202J Big Creek (unclassified water body)**
Water body location: From the confluence of Cottonwood and Kunz Creeks, 5 miles north of Needville in Fort Bend County, downstream to the confluence with the Brazos River
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Upstream portion of water body to Whaley-Longpoint Road	D

SegID: **1209 Navasota River Below Lake Limestone**
Water body location: From the confluence with the Brazos River in Grimes County to Sterling C. Robertson Dam in Leon/Robertson County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	From confluence with Camp Creek to 25 miles upstream	D
5c	bacteria	From confluence with Rocky Creek to confluence with Sandy Branch	D
5c	bacteria	From lower segment boundary to confluence with Rocky Creek	D

SegID: **1209A Country Club Lake (unclassified water body)**
Water body location: From the Country Club Branch Dam up to normal pool elevation in Bryan in Brazos County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	ambient toxicity in sediment	Entire reservoir	D

SegID: **1209B Fin Feather Lake (unclassified water body)**
Water body location: From Fin Feather Dam up to normal pool elevation in northwest Bryan in Brazos County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	ambient toxicity in sediment	Entire lake	D

SegID: **1209C Carters Creek (unclassified water body)**
Water body location: Perennial stream from the confluence with the Navasota River southeast of College Station in Brazos County upstream to the confluence of an unnamed tributary 0.5 km upstream of FM 158 in Brazos County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire water body	D

SegID: **1209G Cedar Creek (unclassified water body)**
Water body location: From the confluence with the Navasota River in Brazos County to the confluence with Moores Branch and Rocky Branch in Robertson County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire water body	D

SegID: **1209I Gibbons Creek (unclassified water body)**
Water body location: From confluence with Navasota River in Grimes County to SH 90 in Grimes County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	From confluence with Dry Creek to SH 90	D
5c	bacteria	From lower end to confluence with Dry Creek	D

SegID: **1209J Shepherd Creek (unclassified water body)**
Water body location: From the confluence with the Navasota River in Madison County to a point 0.7 miles upstream of FM 1452 in Madison County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire water body	D

SegID: **1209K Steele Creek (unclassified water body)**
Water body location: From confluence with Navasota River in Robertson County to a point 2.4 miles upstream of FM 147 in Limestone County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Lower 25 miles	D

SegID: **1210 Lake Mexia**
Water body location: From Bistone Dam in Limestone County up to the normal pool elevation of 448.3 feet (impounds Navasota River)
Overall Category: **5b**

Category	Parameter	Area	Rank
5b	depressed dissolved oxygen	Eastern end of reservoir, from dam to RR 2681 east of Washington Park	S
5b	depressed dissolved oxygen	Narrow center of reservoir around Washington Park	S

5b	depressed dissolved oxygen	Western end, from point where reservoir begins to widen, to upper end	S

SegID: **1210A Navasota River above Lake Mexia (unclassified water body)**
Water body location: From the confluence with the headwaters of Lake Mexia in Limestone County to a point 1.25 miles upstream of SH 31 in Hill County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire water body	D

SegID: **1211A Davidson Creek (unclassified water body)**
Water body location: Intermittent stream with perennial pools from the confluence with Yegua Creek to 0.2 km above SH 21 near Caldwell in Burleson County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Upper 25 miles	D

SegID: **1212 Somerville Lake**
Water body location: From Somerville Dam in Burleson/Washington County up to normal pool elevation of 238 feet (impounds Yegua Creek)
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	low and high pH	Eastern end of reservoir near dam	D

SegID: **1212B East Yegua Creek (unclassified water body)**
Water body location: From the confluence with Middle Yegua and Yegua Creeks southeast of Dime Box in Lee County to the upstream portion of the stream, south of Alcoa Lake in Milam County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Lower 25 miles	D

SegID: **1217 Lampasas River Above Stillhouse Hollow Lake**
Water body location: From a point immediately upstream of the confluence of Rock Creek in Bell County to FM 2005 in Hamilton County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	From the FM 1690 crossing to the CR 117 crossing	D

SegID: **1217A Rocky Creek (unclassified water body)**
Water body location: From the confluence of the Lampasas River north of Okalla in Burnet County to the confluences of the North and South Rocky Creeks south of Oakalla in Burnet County
Overall Category: **5b**

Category	Parameter	Area	Rank
5b	depressed dissolved oxygen	Entire creek	S

SegID: **1218 Nolan Creek/ South Nolan Creek**
Water body location: From the confluence with the Leon River in Bell County to a point 100 meters (110 yards) upstream to the most upstream crossing of US 190 and Loop 172 in Bell County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire segment	D

SegID: **1221 Leon River Below Proctor Lake**
Water body location: From a point 100 meters (110 yards) upstream of FM 236 in Coryell County to Proctor Dam in Comanche County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Portion of segment north of Gustine	D
5c	bacteria	Portion of segment west of US Hwy 281	D

SegID: **1222 Proctor Lake**
Water body location: From Proctor Dam in Comanche County to a point immediately upstream of the confluence of Mill Branch in Comanche County, up to the normal pool elevation of 1162 feet (impounds Leon River)
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	Rush-Copperas Creek arm of lake	D
5c	depressed dissolved oxygen	Sabana River arm of lake	D

SegID: **1222A Duncan Creek (unclassified water body)**
Water body location: From the confluence of Proctor Lake northeast of Comanche in Comanche County to the upstream perennial
portion of the stream west of Comanche in Comanche County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire creek	D

SegID: **1226B Green Creek (unclassified water body)**
Water body location: From the confluence of the North Bosque River south of Clairette in Erath County to the upstream perennial portion of the stream south of Stephenville in Erath County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire water body	D

SegID: **1226E Indian Creek (unclassified water body)**
Water body location: From the confluence with the North Bosque River in Erath County to the headwaters 3.5 miles east of Stephenville in Erath County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire water body	D

SegID: **1226F Sims Creek (unclassified water body)**
Water body location: From the confluence with the North Bosque River in Erath County to the headwaters 6 miles southeast of Stephenville in Erath County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire water body	D

SegID: **1227 Nolan River**
Water body location: From a point immediately upstream of the confluence of Rock Creek in Hill County to Cleburne Dam in Johnson County
Overall Category: **5b**

Category	Parameter	Area	Rank
5b	sulfate	Lower 8 miles	S
5c	bacteria	Upper 8 miles	D
5b	sulfate	Upper 8 miles	S

SegID: **1238 Salt Fork Brazos River**
Water body location: From the confluence of the Double Mountain Fork Brazos River in Stonewall County to the most upstream crossing of SH 207 in Crosby County
Overall Category: **5b**

Category	Parameter	Area	Rank
5b	chloride	25 miles near Hwy 380 at Swenson	S
5b	total dissolved solids	25 miles near Hwy 380 at Swenson	S
5b	chloride	25 miles near Hwy 83	S
5b	total dissolved solids	25 miles near Hwy 83	S
5b	chloride	Remainder of segment	S
5b	total dissolved solids	Remainder of segment	S

SegID: **1240 White River Lake**
Water body location: From White River Dam in Crosby County up to normal pool elevation of 2369 feet (impounds White River)
Overall Category: **5b**

Category	Parameter	Area	Rank
5b	chloride	Entire segment	S

SegID: **1242 Brazos River Above Navasota River**
Water body location: From a point immediately upstream of the confluence of the Navasota River in Brazos/Grimes/Washington County to the low water dam forming Lake Brazos in McLennan County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Downstream portion of segment	D
5c	bacteria	Portion of segment within Waco city limits	D

SegID: **1242D Thompson Creek (unclassified water body)**
Water body location: Intermittent stream with perennial pools from the confluence with the Brazos River upstream to the confluence with Thompson Branch north of FM 1687
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Downstream portion of water body	D
5c	bacteria	Upstream portion of water body	D
5c	depressed dissolved oxygen	Upstream portion of water body	D

SegID: **1242I Campbells Creek (unclassified water body)**
Water body location: From the confluence with the Little Brazos River upstream to the headwaters, one mile west of Old San Antonio Road
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire water body	D

SegID: **1242K Mud Creek (unclassified water body)**
Water body location: From confluence with the Little Brazos River, upstream to the confluence with Touchstone Branch and Wolf Den Branch, in Robertson County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire water body	D

SegID: **1242L Pin Oak Creek (unclassified water body)**
Water body location: From the confluence with the Little Brazos River in Robertson County upstream to the headwaters, 2.07 miles south of Franklin
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire water body	D

SegID: **1242M Spring Creek (unclassified water body)**
Water body location: From the confluence with the Little Brazos River in Robertson County, upstream to the headwaters, 1.5 miles north of FM 391
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire water body	D

SegID: **1242N Tehuacana Creek (unclassified water body)**
Water body location: From the confluence with the Brazos River in McLennan county upstream to the headwaters 2 miles south of Penelope in Hill County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Downstream portion of water body	D

SegID: **1242P Big Creek (unclassified water body)**
Water body location: From the confluence with Little Brazos River in Falls County upstream to the confluence with unnamed creeks near Mart in the northeast corner of Falls County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Upper 33.5 miles	D

SegID: **1243 Salado Creek**
Water body location: From the confluence with the Lampasas River in Bell County to the confluence of North Salado Creek and South Salado Creek in Williamson County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	Lower end of segment to FM 2268	D

SegID: **1245 Upper Oyster Creek**
Water body location: From Steep Bank Creek/Brazos River confluence in Fort Bend County to pumping station on Jones Creek confluence at Brazos River in Fort Bend County (includes portions of Steep Bank Creek, Flat Bank Creek, and Jones Creek)
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	From Dam #1 to Oyster Creek/Jones Creek confluence	D
5c	depressed dissolved oxygen	From Dam #3, just upstream of Lexington Blvd. to the Brooks Lake outfall	D
5c	bacteria	From Hwy 90A to Dam #1, located 1.5 miles upstream of Harmon St.	D
5c	depressed dissolved oxygen	From Hwy 90A to Dam #1, located 1.5 miles upstream of Harmon St.	D
5c	depressed dissolved oxygen	From Oyster Creek/Jones Creek confluence to upper end of segment	D
5c	depressed dissolved oxygen	From lower end of segment to Dam #3, just upstream of Lexington Blvd.	D
5c	depressed dissolved oxygen	From the Brooks Lake outfall to Hwy 90A	D

SegID: **1246E Wasp Creek (unclassified water body)**
Water body location: From the confluence with Tonk Creek in Crawford in McLennan County, upstream to the headwaters in Coryell County, 0.15 mile east of FM 185
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire water body	D

SegID: **1247A Willis Creek (unclassified water body)**
Water body location: From the confluence with the headwaters of Granger Lake in Williamson County to CR 313 in Williamson County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire water body	D

SegID: **1248 San Gabriel/North Fork San Gabriel River**
Water body location: From point 1.9 km (1.2 miles) downstream of SH 95 in Williamson County to North San Gabriel Dam in Williamson County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	total dissolved solids	From confluence of South Fork San Gabriel River to North San Gabriel Dam	D
5c	total dissolved solids	From confluence with Weir Branch to confluence with South Fork San Gabriel	D
5c	total dissolved solids	From lower end of segment to the confluence with Weir Branch	D

SegID: **1254 Aquilla Reservoir**
Water body location: From Aquilla Dam in Hill County up to the normal pool elevation of 537.5 feet (impounds Aquilla Creek)
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	atrazine in finished drinking water	Aquilla Creek arm on the west	H
5c	depressed dissolved oxygen	Aquilla Creek arm on the west	D
5a	atrazine in finished drinking water	Hackberry Creek arm on the east	H
5c	depressed dissolved oxygen	Hackberry Creek arm on the east	D
5a	atrazine in finished drinking water	South end of reservoir near dam	H
5c	depressed dissolved oxygen	South end of reservoir near dam	D

SegID: **1255 Upper North Bosque River**
Water body location: From a point immediately above the confluence of Indian Creek in Erath County to the confluence of the North Fork and South Fork of the Bosque River in Erath County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Downstream portion of segment	D
5c	bacteria	Upstream portion of segment	D

SegID: **1255A Goose Branch (unclassified water body)**
Water body location: From the confluence with the south fork of the North Bosque River 2.5 miles (4.0 km) west of Stephenville, upstream to the headwaters 0.5 miles (0.8 km) north of FM 8 in Erath County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire water body	L

SegID: **1255B North Fork Upper North Bosque River (unclassified water body)**
Water body location: From the confluence with the South Fork of the Upper North Bosque River in Stephenville, upstream to the headwaters, 2.0 miles north of FM 219
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire water body	D

SegID: **1255C Scarborough Creek (unclassified water body)**
Water body location: From the confluence with the North Fork of the upper North Bosque River, upstream to the headwaters 0.1 miles (0.2 km) southeast of FM 219 in Erath County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire water body	D

SegID: **1255D South Fork North Bosque River (unclassified water body)**
Water body location: From the confluence with the North Fork of the upper North Bosque River in Stephenville, upstream to the headwaters 3 miles (4.8 km) north of FM 219 in Erath County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Downstream portion of water body	D
5c	bacteria	Upstream portion of water body	D

SegID: **1255E Unnamed tributary of Goose Branch (unclassified water body)**
Water body location: From the confluence with Goose Branch in Erath County to its headwaters, 0.2 miles southeast of the intersection of FM 8 and Farm Road 1219
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria	Entire water body	L

SegID: **1255F Unnamed tributary of Scarborough Creek (unclassified water body)**
Water body location: From the confluence with Scarborough Creek, 1.0 mile west of SH 108 in Erath County, upstream to the headwaters, 0.3 mile north of FM 219
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire water body	D

SegID: **1255G Woodhollow Branch (unclassified water body)**
Water body location: From the confluence with the South Fork of the North Bosque River, 6 miles northwest of Stephenville, upstream to the headwaters, 1.5 miles north of FM 219 in Erath County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire water body	D

SegID: **1302 San Bernard River Above Tidal**
Water body location: From a point 3.2 km (2.0 miles) upstream of SH 35 in Brazoria County to the county road southeast of New Ulm in Austin County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Lower 50 miles	D

SegID: **1305 Caney Creek Above Tidal**
Water body location: From a point 1.9 km (1.2 miles) upstream of the confluence of Linnville Bayou in Matagorda County to Old Caney Road in Wharton County
Overall Category: **5b**

Category	Parameter	Area	Rank
5c	bacteria	25 miles surrounding SH 35	D
5b	depressed dissolved oxygen	25 miles surrounding SH 35	S

SegID: **1402A Cummins Creek (unclassified water body)**
Water body location: Perennial stream from the confluence with the Colorado River upstream to the confluence of Boggy Creek at 1291 in Colorado County
Overall Category: **5b**

Category	Parameter	Area	Rank
5b	impaired fish community	Lower 25 miles of water body	S
5b	impaired macrobenthos community	Lower 25 miles of water body	S

SegID: **1403A Bull Creek (unclassified water body)**
Water body location: From the confluence of Lake Austin in northwest Austin in Travis County to the upstream perennial portion of the stream north of Austin in Travis County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	impaired macrobenthos community	From most downstream xing to most upstream xing of Spicewood Springs Rd.	D

SegID: **1403J Spicewood Tributary to Shoal Creek (unclassified water body)**
Water body location: From the MoPac Expressway in north Austin in Travis County to a point west of Hart Lane in Travis County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire water body	D

SegID: **1403K Taylor Slough South (unclassified water body)**
Water body location: Form the confluence of Lake Austin in Travis County to a point west of Pecos Street in Austin in Travis County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire water body	D

SegID: **1411 E. V. Spence Reservoir**
Water body location: From Robert Lee Dam in Coke County to a point immediately upstream of the confluence of Little Silver Creek in Coke County, up to the normal pool elevation of 1898 feet (impounds Colorado River)
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	sulfate	Main pool near dam	H
5a	total dissolved solids	Main pool near dam	H
5a	sulfate	Remainder of reservoir	H
5a	total dissolved solids	Remainder of reservoir	H

SegID: **1420 Pecan Bayou Above Lake Brownwood**
Water body location: From a point 100 meter (110 yards) upstream of FM 2559 in Brown County to the confluence of the North Prong Pecan Bayou and the South Prong of Pecan Bayou in Callahan County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	Lower 25 miles	D

SegID: **1421 Concho River**
Water body location: From a point 2 km (1.2 miles) above the confluence of Fuzzy Creek in Concho County to San Angelo Dam on the North Concho River in Tom Green County and to Nasworthy Dam on the South Concho River in Tom Green County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	impaired macrobenthos community	Loop 306 to end of segment, including both North and South forks	D

SegID: **1425 O. C. Fisher Lake**
Water body location: From San Angelo Dam in Tom Green County up to normal pool elevation of 1908 feet (impounds North Concho River)
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	chloride	Entire reservoir	D
5c	total dissolved solids	Entire reservoir	D

SegID: **1426 Colorado River Below E. V. Spence Reservoir**
Water body location: From a point 3.7 km (2.3 miles) below the confluence of Mustang Creek in Runnels County to Robert Lee Dam in Coke County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	chloride	Coke County line to SH 208	H
5a	total dissolved solids	Coke County line to SH 208	H
5a	chloride	Country Club Lake to Coke County line	H
5a	total dissolved solids	Country Club Lake to Coke County line	H
5a	chloride	Lower end of segment to Country Club Lake	H

5a	total dissolved solids	Lower end of segment to Country Club Lake	H
5a	chloride	SH 208 to dam	H
5a	total dissolved solids	SH 208 to dam	H

SegID: **1427 Onion Creek**
Water body location: From the confluence with the Colorado River in Travis County to the most upstream crossing of FM 165 in Blanco County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	From end of segment upstream to US 183	D

SegID: **1427A Slaughter Creek (unclassified water body)**
Water body location: Intermittent stream with perennial pools from the confluence with Onion Creek to above US 290 west of Austin
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	impaired macrobenthos community	Entire water body	D

SegID: **1428C Gilleland Creek (unclassified water body)**
Water body location: Perennial stream and intermittent stream with perennial pools from the confluence with the Colorado River up to the spring source (Ward Spring) northwest of Pflugerville, in Travis County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	From Taylor Lane upstream to Old Highway 20	D

SegID: **1429B Eanes Creek (unclassified water body)**
Water body location: From the confluence of Town Lake in central Austin in Travis County to the upstream perennial portion of the stream in west Austin in Travis County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire water body	D

SegID: **1429C Waller Creek (unclassified water body)**
Water body location: From the confluence of Town Lake in central Austin in Travis county to the upstream portion of the stream in north Austin in Travis County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	impaired macrobenthos community	From the confluence with Town Lake to East MLK Blvd.	D

SegID: **1501 Tres Palacios Creek Tidal**
Water body location: From the confluence with Tres Palacios Bay in Matagorda County to a point 1.0 km (0.6 miles) upstream of the confluence of Wilson creek in Matagorda County
Overall Category: **5b**

Category	Parameter	Area	Rank
5b	depressed dissolved oxygen	Entire segment	S

SegID: **1502 Tres Palacios Creek Above Tidal**
Water body location: From a point 1.0 km (0.6 miles) upstream of the confluence of Wilson Creek in Matagorda County to US 59 in Wharton County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Middle 23 miles of segment	D

SegID: **1604 Lake Texana**
Water body location: From Palmetto Bend Dam in Jackson County to a point 100 meters (110 yards) downstream of FM 530 in Jackson County, up to normal pool elevation of 44 feet (impounds Navidad River)
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	East Mustang Creek arm of Lake Texana	D
5c	depressed dissolved oxygen	Navidad River arm of Lake Texana	D

SegID: **1801 Guadalupe River Tidal**
Water body location: From the confluence with Guadalupe Bay in Calhoun/Refugio County to the Guadalupe-Blanco River Authority Salt Water Barrier 0.7 km (0.4 miles) downstream of the confluence of the San Antonio River in Calhoun/Refugio County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	Entire segment	D

SegID: **1803A Elm Creek (unclassified water body)**
Water body location: From the confluence of Sandies Creek east of Smiley in Gonzales County to the upstream perennial portion of the stream southwest of Smiley in Gonzales County
Overall Category: **5b**

Category	Parameter	Area	Rank
5c	bacteria	Entire water body	D
5b	depressed dissolved oxygen	Entire water body	S

SegID: **1803B Sandies Creek (unclassified water body)**
Water body location: From the confluence of the Guadalupe River west of Cuero in DeWitt County to the upstream perennial
portion of the stream northwest of Smiley in Gonzales County
Overall Category: **5b**

Category	Parameter	Area	Rank
5c	bacteria	From the confluence with Elm Creek to upper end of water body	D
5c	bacteria	From the confluence with the Guadalupe River to the confluence with Elm Ck.	D

5b	depressed dissolved oxygen	From the confluence with the Guadalupe River to the confluence with Elm Ck.	S

SegID: **1803C Peach Creek (unclassified water body)**
Water body location: From the confluence of the Guadalupe River southeast of Gonzales in Gonzales County to the upstream perennial portion of the stream northeast of Waelder in Gonzales County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Lower 25 miles of water body	D

SegID: **1806 Guadalupe River Above Canyon Lake**
Water body location: From a point 2.7 km (1.7 miles) downstream of Rebecca Creek Road in Comal County to the confluence of North Fork Guadalupe River and the South Fork Guadalupe River in Kerr County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	From 1 mile upstream Flat Rock Dam to confluence with Camp Meeting Creek	D
5c	bacteria	From RR 394 1 mile downstream	D

SegID: **1806A Camp Meeting Creek (unclassified water body)**
Water body location: From the confluence of Flatrock Lake in southeast Kerrville in Kerr County to the upstream perennial portion of the stream west of Kerrville in Kerr County
Overall Category: **5b**

Category	Parameter	Area	Rank
5b	depressed dissolved oxygen	Entire water body	S

SegID: **1815 Cypress Creek**
Water body location: From the confluence with the Blanco River in Hays County to a point 6.4 km (4.0 miles) upstream of the most upstream unnamed county road crossing Hays County
Overall Category: **5b**

Category	Parameter	Area	Rank
5b	depressed dissolved oxygen	Lower 7 miles of segment	S
5b	depressed dissolved oxygen	Upper 7 miles of segment	S

SegID: **1901 Lower San Antonio River**
Water body location: From the confluence with the Guadalupe River in Refugio/Victoria County to a point 600 meters (660 yards) downstream of FM 791 at Mays crossing near Falls City in Karnes County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	25 miles downstream of the confluence with Manahuilla Creek	D
5c	bacteria	25 miles upstream of Manahuilla Creek	D

5c	bacteria	9 miles downstream of Escondido Creek	D

SegID: **1906 Lower Leon Creek**
Water body location: From the confluence with the Medina River in Bexar County to a point 100 meters (110 yards) upstream of SH 16 northwest of San Antonio in Bexar County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	From 2 miles upstream of Hwy 353 to Hwy 90	D
5c	depressed dissolved oxygen	From 2 miles upstream of Hwy 353 to Hwy 90	D
5c	depressed dissolved oxygen	From 3 miles upstream lower end of segment to confluence with Indian Creek	D
5c	depressed dissolved oxygen	From Hwy 353 to two miles upstream	D
5c	depressed dissolved oxygen	From confluence with Indian Creek to Hwy 353	D
5c	depressed dissolved oxygen	Lower 3 miles of segment	D
5c	depressed dissolved oxygen	Remainder of segment	D

SegID: **1908 Upper Cibolo Creek**
Water body location: From the Missouri-Pacific Railroad Bridge west of Bracken in Comal County to a point 1.5 km (0.9 miles) upstream of the confluence of Champee Springs in Kendall County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	From confl. with Balcones Ck. to approx. 2 mi. upstream of Hwy 87 in Boerne	D

SegID: **1910 Salado Creek**
Water body location: From the confluence with the San Antonio River in Bexar County to Rocking Horse Lane west of Camp Bullis in Bexar County
Overall Category: **5b**

Category	Parameter	Area	Rank
5c	bacteria	From Hwy 368 to approx 1.5 miles upstream of Loop 410	D
5b	depressed dissolved oxygen	From Hwy 368 to approx 1.5 miles upstream of Loop 410	S
5c	bacteria	From IH 10 to approx 1.5 miles upstream of IH 35	D
5b	depressed dissolved oxygen	From IH 10 to approx 1.5 miles upstream of IH 35	S
5c	bacteria	From Rice Road to IH 10	D
5b	depressed dissolved oxygen	From Rice Road to IH 10	S
5c	bacteria	From Roland Road to Rice Road	D
5b	depressed dissolved oxygen	From Roland Road to Rice Road	S

5c	bacteria	From approx. 1.5 miles upstream of IH 35 to Hwy 368	D
5b	depressed dissolved oxygen	From approx. 1.5 miles upstream of IH 35 to Hwy 368	S
5c	bacteria	From confluence with Rosillo Creek to Roland Road	D
5c	bacteria	From confluence with San Antonio River to confluence with Rosillo Creek	D

SegID: **1910A Walzem Creek (unclassified water body)**
Water body location: From the confluence with Salado Creek to approximately 1.5 miles upstream of Walzem Road in San Antonio
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Lower 0.25 miles	D

SegID: **1911 Upper San Antonio River**
Water body location: From a point 600 meters (660 yards) downstream of FM 791 at Mays Crossing near Falls City in Karnes County to a point 100 meters (110 yards) upstream of Hildebrand Avenue at San Antonio in Bexar County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	From 3 miles upstream of confluence w/ Medina R. to confluence w/ Salado Cr	D
5c	bacteria	From Bexar CR 125 to approx. 2 miles downstream confluence with Medina R.	D
5c	bacteria	From confluence with Salado Creek to confluence with Sixmile Creek	D
5c	bacteria	Upper 8 miles of segment	D

SegID: **1913 Mid Cibolo Creek**
Water body location: From a point 100 meters (110 yards) downstream of IH 10 in Bexar/Guadalupe County to the Missouri-Pacific Railroad bridge west of Bracken in Comal County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	From approx. 0.10 mi. upstrm of Buffalo Train in Cibolo to upper end of seg	D

SegID: **2104 Nueces River Above Frio River**
Water body location: From the confluence of the Frio River in Live Oak County to Holland Dam in LaSalle County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	25 miles surrounding SH 16	D

SegID: **2107 Atascosa River**
Water body location: From the confluence with the Frio River in Live Oak County to the confluence of the West Prong Atascosa River and the North Prong Atascosa River in Atascosa County
Overall Category: **5b**

Category	Parameter	Area	Rank
5c	bacteria	25 miles surrounding U.S. 281	D
5b	depressed dissolved oxygen	25 miles surrounding U.S. 281	S

SegID: **2110 Lower Sabinal River**
Water body location: From the confluence with the Frio River in Frio County to Uvalde County to a point 100 meters (110 yards) upstream of SH 127 in Uvalde County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	nitrate+nitrite nitrogen	Entire segment	H

SegID: **2113 Upper Frio River**
Water body location: From a point 100 meters (110 yards) upstream of US 90 in Uvalde County to the confluence of the West Frio River and the East Frio River in Real County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	25 miles surrounding SH 127	D

SegID: **2116 Choke Canyon Reservoir**
Water body location: From Choke Canyon Dam in Live Oak County to a point 4.2 km (2.6 miles) downstream of SH 16 on the Frio River Arm in McMullen County and to a point 100 meters (110 yards) upstream of the confluence of Mustang Branch on the San Miguel Creek Arm in McMullen County, up to the normal pool elevation of 220.5 feet (impounds Frio River)
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	5120 acres in middle of lake	D
5c	total dissolved solids	5120 acres in middle of lake	D
5c	bacteria	5120 acres near dam	D
5c	total dissolved solids	5120 acres near dam	D
5c	bacteria	Large north arm near mid lake nd Jacob Oil Field	D
5c	total dissolved solids	Large north arm near mid lake and Jacob Oil Field	D
5c	bacteria	Remainder of lake	D
5c	total dissolved solids	Remainder of lake	D
5c	bacteria	Small north arm of lake near dam and Willow Hollow Tank	D
5c	total dissolved solids	Small north arm of lake near dam and Willow Hollow Tank	D
5c	bacteria	Southern arm near mid lake and Rec. Road 7 west of Calliham	D
5c	total dissolved solids	Southern arm near mid lake and Rec. Road 7 west of Calliham	D
5c	bacteria	Western end of lake up to RR 99 bridge	D

5c	total dissolved solids	Western end of lake up to RR 99 bridge	D

SegID: **2117 Frio River Above Choke Canyon Reservoir**
Water body location: From a point 4.2 km (2.6 miles) downstream of SH 16 in McMullen County to a point 100 meters (110 yards) upstream of US 90 in Uvalde County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	25 mi. surrounding La Salle CR crossing north of SH 97	D
5c	depressed dissolved oxygen	25 miles surrounding IH 35	D
5c	depressed dissolved oxygen	From 2 mi. downstream of SH 97 to 14 mi. upstream of SH 97 crossing	D
5c	bacteria	Lower 25 miles of segment	D
5c	depressed dissolved oxygen	Lower 25 miles of segment	D

SegID: **2201 Arroyo Colorado Tidal**
Water body location: From confluence with Laguna Madre in Cameron/Willacy County to a point 100 meters (110 yards) downstream of Cemetery Road south of Port Harlingen in Cameron County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	ambient toxicity in sediment	Approx. 1 mile upstream to 3 miles downstream of Camp Perry	D
5c	depressed dissolved oxygen	Approx. 1 mile upstream to 3 miles downstream of Camp Perry	D
5c	ambient toxicity in sediment	Approx. 2 miles upstream to approx. 2 miles downstream of Marker 22	D
5c	ambient toxicity in sediment	Approx. 3 miles upstream to 2 miles downstream of Marker 27	D
5c	ambient toxicity in sediment	Lower 9.0 miles of segment	D
5c	ambient toxicity in sediment	Upper 4 miles of segment	D
5c	depressed dissolved oxygen	Upper 4 miles of segment	D

SegID: **2202 Arroyo Colorado Above Tidal**
Water body location: From a point 100 meters (110 yards) downstream of Cemetery Road south of Port Harlingen in Cameron County to FM 2062 in Hidalgo County
Overall Category: **5a**

Category	Parameter	Area	Rank
5c	bacteria	Approx 14 miles upstream to approx. 11 miles downstream of FM 1015	D
5a	other organic compounds in fish tissue	Approx 14 miles upstream to approx. 11 miles downstream of FM 1015	M
5a	other organic compounds	Approx. 11 miles upstream to	M

	in fish tissue	approx. 4 miles downstream of US 77	
5c	bacteria	Lower 4 miles of segment	D
5a	other organic compounds in fish tissue	Lower 4 miles of segment	M
5a	other organic compounds in fish tissue	Upper 19 miles of segment	M

SegID: **2204 Petronila Creek Above Tidal**
Water body location: From a point 1 km (0.6 miles) upstream of private road crossing near Laureles Ranch in Kleberg County to the confluence of Agua Dulce and Banquete Creeks in Nueces County
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	chloride	Lower 25 miles of segment	M
5a	sulfate	Lower 25 miles of segment	M
5a	total dissolved solids	Lower 25 miles of segment	M
5a	chloride	Upper 19 miles of segment	M
5a	sulfate	Upper 19 miles of segment	M
5a	total dissolved solids	Upper 19 miles of segment	M

SegID: **2302 Rio Grande Below Falcon Reservoir**
Water body location: From a point 10.8 km (6.7 miles) downstream of the International Bridge in Cameron County to Falcon Dam in Starr County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Pharr International Bridge to downstream of the Santa Ana Wildlife Refuge	D

SegID: **2304 Rio Grande Below Amistad Reservoir**
Water body location: From the confluence of the Arroyo Salado (Mexico) in Zapata County to Amistad Dam in Val Verde County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	3 miles downstream of U.S. 277	D
5c	ambient toxicity in water	4.5 miles downstream of Hwy 277	D
5c	bacteria	4.5 miles downstream of Hwy 277	D
5c	bacteria	Downstream of International Bridge 2 to pipeline crossing	D
5c	bacteria	El Cenizo to San Isidro pump station	D
5c	bacteria	Pipeline crossing to downstream of El Cenizo	D
5c	bacteria	San Isidro pump station to segment boundary	D

SegID: **2306 Rio Grande Above Amistad Reservoir**
Water body location: From a point 1.8 km (1.1 miles) downstream of the confluence of Ramsey Canyon in Val Verde County to the confluence of the Rio Conchos (Mexico) in Presidio County

Overall Category: **5c**

Category	Parameter	Area	Rank
5c	ambient toxicity in water	25 miles downstream of upper segment boundary	D
5c	bacteria	25 miles downstream of upper segment boundary	D

SegID: **2307 Rio Grande Below Riverside Diversion Dam**
Water body location: From the confluence of the Rio Conchos (Mexico) in Presidio County to Riverside Diversion Dam in El Paso County
Overall Category: **5b**

Category	Parameter	Area	Rank
5b	chloride	25 miles upstream of segment boundary	S
5b	total dissolved solids	25 miles upstream of segment boundary	S
5b	chloride	Arroyo Diablo to 1 mile downstream of Neely Canyon	S
5b	total dissolved solids	Arroyo Diablo to 1 mile downstream of Neely Canyon	S
5c	bacteria	Guadalupe Bridge to Arroyo Diablo	D
5b	chloride	Guadalupe Bridge to Arroyo Diablo	S
5b	total dissolved solids	Guadalupe Bridge to Arroyo Diablo	S
5b	chloride	Remainder of segment	S
5b	total dissolved solids	Remainder of segment	S

SegID: **2314 Rio Grande Above International Dam**
Water body location: From International Dam in El Paso County to the New Mexico State Line in El Paso County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Upstream of Anthony Drain to International Dam	D

SegID: **2421 Upper Galveston Bay**
Water body location:
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria (oyster waters)	Area west of a line from Eagle Point to Five Mile Pass to Houston Point	L
5a	dioxin in catfish and crab tissue	Red Bluff to Five Mile Cut to Houston Point to Morgans Point	H

SegID: **2422 Trinity Bay**
Water body location:
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria (oyster waters)	Area in the northern portion of the bay near Trinity River confluence	L

SegID: **2423 East Bay**
Water body location:
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria (oyster waters)	Area at the east end of the bay near East Bay Bayou and ICWW to Marsh Point	L

SegID: **2424 West Bay**
Water body location:
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria (oyster waters)	24.4 square miles at the east end near Galveston and Texas City	L

SegID: **2424A Highland Bayou (unclassified water body)**
Water body location: From confluence with Jones Bay to Avenue Q 1/2 north of SH 6 between Arcadia and Alta Loma in Galveston County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	From FM 2001 to FM 519	D
5c	bacteria	From Fairwood Road to Bayou Lane	D
5c	bacteria	From the headwaters to FM 2004	D
5c	depressed dissolved oxygen	From the headwaters to FM 2004	D

SegID: **2424C Marchand Bayou (unclassified water body)**
Water body location: From confluence with Highland Bayou to 0.45 mile north of IH 45 in Galveston County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Entire bayou	D
5c	depressed dissolved oxygen	Entire bayou	D

SegID: **2425B Jarbo Bayou (unclassified water body)**
Water body location: From confluence with Clear Lake to 0.6 mile upstream of FM 518 in Galveston County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	From Lawrence Road to confluence with Clear Lake	D

5c	bacteria	From headwaters to Lawrence Road	D

SegID: **2425C Robinson Bayou (unclassified water body)**
Water body location: From confluence with Clear Lake to 0.33 mile upstream of Webster Street in Galveston County
Overall Category: **5a**

Category	Parameter	Area	Rank
5c	bacteria	From Abilene St. to confluence with Clear Lake	D
5a	bacteria	From headwater to Abilene St.	M

SegID: **2426 Tabbs Bay**
Water body location:
Overall Category: **5a**

Category	Parameter	Area	Rank
5c	bacteria	Entire segment	D
5a	dioxin in catfish and crab tissue	Entire segment	H

SegID: **2427 San Jacinto Bay**
Water body location:
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	dioxin in catfish and crab tissue	Entire segment	H

SegID: **2428 Black Duck Bay**
Water body location:
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	dioxin in catfish and crab tissue	Entire segment	H

SegID: **2429 Scott Bay**
Water body location:
Overall Category: **5a**

Category	Parameter	Area	Rank
5c	bacteria	Entire segment	D
5a	dioxin in catfish and crab tissue	Entire segment	H

SegID: **2430 Burnett Bay**
Water body location:
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	dioxin in catfish and crab tissue	Entire segment	H

SegID: **2432 Chocolate Bay**
Water body location:
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria (oyster waters)	Entire segment	L

SegID: **2436 Barbours Cut**
Water body location:
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	dioxin in catfish and crab tissue	Entire segment	H

SegID: **2437 Texas City Ship Channel**
Water body location:
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	Entire segment	D

SegID: **2438 Bayport Channel**
Water body location:
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	dioxin in catfish and crab tissue	Entire Segment	H

SegID: **2439 Lower Galveston Bay**
Water body location:
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria (oyster waters)	60.7 square miles from Galveston to Texas City to Port Bolivar	L

SegID: **2441 East Matagorda Bay**
Water body location:
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria (oyster waters)	1.5 square miles near the Caney Creek confluence and along the ICWW	L

SegID: **2442 Cedar Lakes**
Water body location:
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria (oyster waters)	Entire segment	D

SegID: **2451 Matagorda Bay/Powderhorn Lake**
Water body location:
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria (oyster waters)	21.7 square miles at the east end of the bay	L
5c	depressed dissolved oxygen	East half of main bay	D

SegID: **2452 Tres Palacios Bay/Turtle Bay**
Water body location:
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria (oyster waters)	7.2 square miles - upper half Tres Palacios Bay and Turtle Bay	L
5c	depressed dissolved oxygen	Palacios area	D

SegID: **2453 Lavaca Bay/Chocolate Bay**
Water body location:
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria (oyster waters)	North end near Lavaca R. confl, near Port Lavaca, Pt Comfort, Chocolate Bay	L
5c	depressed dissolved oxygen	Point Comfort area	D
5a	mercury in fish and crab tissue	Point Comfort area	H
5c	mercury in water	Point Comfort area	D

SegID: **2453A Garcitas Creek Tidal (unclassified water body)**
Water body location: From the confluence of Lavaca Bay in Jackson County to a point 8.5 miles upstream of FM 616 in Jackson County
Overall Category: **5b**

Category	Parameter	Area	Rank
5b	depressed dissolved oxygen	Entire water body	S

SegID: **2456 Carancahua Bay**
Water body location:
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria (oyster waters)	9.2 square miles at the north end of the bay and Carancahua Creek	L
5c	high pH	9.2 square miles at the north end of the bay and Carancahua Creek	D

SegID: **2462 San Antonio Bay/Hynes Bay/Guadalupe Bay**
Water body location:
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria (oyster waters)	Guadalupe Bay, San Antonio Bay near Seadrift and ICWW	L

SegID: **2472 Copano Bay/Port Bay/Mission Bay**
Water body location:
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	bacteria (oyster waters)	Area along southern shore including Port Bay, area near Bayside	L

SegID: **2482 Nueces Bay**
Water body location:
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	zinc in oyster tissue	Remainder of bay	M
5a	zinc in oyster tissue	South shore power line	M
5a	zinc in oyster tissue	US 181 causeway	M
5a	zinc in oyster tissue	Whites Point	M

SegID: **2483A Conn Brown Harbor (unclassified water body)**
Water body location: From the confluence with the Aransas Channel southeast of Aransas Pass in San Patricio County to a point 1mile northeast in Aransas County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	Entire harbor	D

SegID: **2485 Oso Bay**
Water body location:
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	Entire bay	D

SegID: **2485A Oso Creek (unclassified water body)**
Water body location: From the confluence with Oso Bay in southern Corpus Christi to a point 3 miles upstream of SH 44, west of Corpus Christi in Nueces County
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	bacteria	Lower 25 miles of water body	D

SegID: **2491 Laguna Madre**
Water body location:
Overall Category: **5c**

Category	Parameter	Area	Rank
5c	depressed dissolved oxygen	Area around the mouth of Baffin Bay	D
5c	depressed dissolved oxygen	Area around the mouth of the Arroyo Colorado	D
5c	depressed dissolved oxygen	Area near upper end of Padre Island National Seashore	D
5c	depressed dissolved oxygen	Upper Laguna Madre near Packery Channel Park	D

SegID: **2501 Gulf of Mexico**
Water body location: From the Gulf shoreline to the limit of Texas jurisdiction between Sabine Pass and the Rio Grande
Overall Category: **5a**

Category	Parameter	Area	Rank
5a	mercury in king mackerel > 43 inches	Bolivar Point to Port Aransas	H
5a	mercury in king mackerel > 43 inches	Jefferson-Chambers County line area	H
5a	mercury in king mackerel > 43 inches	Near Bolivar Roads/Bolivar Point	H
5a	mercury in king mackerel > 43 inches	Port Aransas area	H
5a	mercury in king mackerel > 43 inches	Port Isabel area	H
5a	mercury in king mackerel > 43 inches	Port Mansfield area	H
5c	depressed dissolved oxygen	Sabine Pass area	D
5a	mercury in king mackerel > 43 inches	Sabine Pass area	H

APPENDIX B

Table B-1: Rainfall Monitoring Data

City	Location	Date	Drainage Area	Rain	Duration	Rainfall volume	Runoff Volume	Flow	Intensity	Antecedent Rain
			acres	inches	hrs	ft3	ft3	cfs	in/hr	days
Corpus Christi	TxDOT	9/14/2000	NA	0.06	NA	NA	NA	NA	NA	NA
Corpus Christi	TxDOT	11/4/2000	NA	0.22	NA	NA	NA	NA	NA	NA
Corpus Christi	TxDOT	12/26/2000	NA	1.12	NA	NA	NA	NA	NA	NA
Corpus Christi	TxDOT	1/10/2001	NA	0.55	NA	NA	NA	NA	NA	NA
Corpus Christi	TxDOT	3/2/2001	NA	0.38	NA	NA	NA	NA	NA	NA
Corpus Christi	TxDOT	3/27/2001	NA	NA	NA	NA	NA	NA	NA	NA
Corpus Christi	TxDOT	5/21/2001	NA	0.81	NA	NA	NA	NA	NA	NA
San Antonio	Leon Creek Outfall	10/17/1999	NA	1.2	8	NA	NA	1.86	NA	NA
San Antonio	Leon Creek Outfall	2/23/2000	NA	0.58	1.2	NA	NA	5.57	NA	NA
San Antonio	Leon Creek Outfall	5/19/2000	NA	1.2	6.3	NA	NA	2.01	NA	NA
San Antonio	Leon Creek Outfall	9/12/2000	NA	2.7	5.6	NA	NA	3.87	NA	NA
San Antonio	Leon Creek Outfall	11/2/2000	NA	2.2	3.5	NA	NA	8.82	NA	NA
Beaumont	TxDOT 001 Outfall	05/01/00 - 09/30/00	NA	NA	NA	NA	NA	NA	NA	NA
Beaumont	TxDOT 001 Outfall	10/01/00 - 12/31/00	NA	NA	NA	NA	NA	NA	NA	NA
Beaumont	TxDOT 001 Outfall	01/01/01 - 04/30/01	NA	NA	NA	NA	NA	NA	NA	NA
Beaumont	TxDOT 001 Outfall	05/01/01 - 09/30/01	NA	NA	NA	NA	NA	NA	NA	NA
Beaumont	TxDOT 002 Outfall	01/01/00 - 03/01/00	NA	NA	NA	NA	NA	NA	NA	NA
Beaumont	TxDOT 002 Outfall	05/01/00 - 09/30/00	NA	NA	NA	NA	NA	NA	NA	NA
Beaumont	TxDOT 002 Outfall	10/01/00 - 12/31/00	NA	NA	NA	NA	NA	NA	NA	NA

City	Location	Date	Drainage Area	Rain	Duration	Rainfall volume	Runoff Volume	Flow	Intensity	Antecedent Rain
			acres	inches	hrs	ft3	ft3	cfs	in/hr	days
Beaumont	TxDOT 002 Outfall	01/01/01 - 04/30/01	NA	NA	NA	NA	NA	NA	NA	NA
Beaumont	TxDOT 002 Outfall	05/01/01 - 09/30/01	NA	NA	NA	NA	NA	NA	NA	NA
Houston	Loop 610	2/20/1999	NA	NA	NA	NA	NA	NA	NA	NA
Houston	Loop 610	4/26/1999	NA	NA	NA	NA	NA	NA	NA	NA
Houston	Loop 610	11/22/1999	NA	NA	NA	NA	NA	NA	NA	NA
Houston	Loop 610	12/9/1999	NA	NA	NA	NA	NA	NA	NA	NA
Houston	Loop 610	6/19/2000	NA	NA	NA	NA	NA	NA	NA	NA
Houston	U.S. 59	3/19/1999	NA	NA	NA	NA	NA	NA	NA	NA
Houston	U.S. 59	4/26/1999	NA	NA	NA	NA	NA	NA	NA	NA
Houston	U.S. 59	6/25/1999	NA	NA	NA	NA	NA	NA	NA	NA
Houston	U.S. 59	9/28/1999	NA	NA	NA	NA	NA	NA	NA	NA
Houston	U.S. 59	12/9/1999	NA	NA	NA	NA	NA	NA	NA	NA
Houston	U.S. 59	6/19/2000	NA	NA	NA	NA	NA	NA	NA	NA
Fort Worth	Deer Creek Outfall	5/2/1994	63.13	0.40	6.3	1443034	13500	NA	NA	NA
Fort Worth	Deer Creek Outfall	5/9/1994	63.13	0.58	3.1	710064	30400	NA	NA	NA
Fort Worth	Deer Creek Outfall	8/21/1994	63.13	0.30	4.7	1076549	9580	NA	NA	NA
Fort Worth	Deer Creek Outfall	8/31/1994	63.13	0.74	3.2	732970	19800	NA	NA	NA
Fort Worth	Deer Creek Outfall	10/7/1994	63.13	0.68	2.5	572633	36200	NA	NA	NA
Fort Worth	Deer Creek Outfall	11/2/1994	63.13	0.32	3.0	687159	16900	NA	NA	NA
Fort Worth	Deer Creek Outfall	11/9/1994	63.13	0.36	3.1	710064	17200	NA	NA	NA
Fort Worth	Deer Creek Outfall	2/6/1997	63.13	1.07	21	245203	65800	NA	0.0021	27
Fort Worth	Deer Creek Outfall	2/12/1997	63.13	1.23	6.3	281869	138000	NA	0.0081	5
Fort Worth	Deer Creek Outfall	3/12/1997	63.13	0.59	5	135206	40800	NA	0.0049	9
Fort Worth	Deer Creek Outfall	3/25/1997	63.13	0.81	7.9	185621	52800	NA	0.0043	12
Fort Worth	Deer Creek Outfall	4/3/1997	63.13	0.42	8.25	96248	14300	NA	0.0021	8

City	Location	Date	Drainage Area	Rain	Duration	Rainfall volume	Runoff Volume	Flow	Intensity	Antecedent Rain
			acres	inches	hrs	ft3	ft3	cfs	in/hr	days
Fort Worth	Deer Creek Outfall	10/7/1997	63.13	0.59	NA	16500	NA	NA	NA	13
Fort Worth	Deer Creek Outfall	5/27/1998	63.13	1.86	NA	50700	NA	NA	NA	NA
Fort Worth	Deer Creek Outfall	12/18/1998	63.13	0.51	NA	NA	NA	NA	NA	NA
Fort Worth	Deer Creek Outfall	3/18/1999	63.13	NA	NA	NA	NA	NA	NA	NA
Fort Worth	Deer Creek Outfall	9/13/1999	63.13	0.52	1.65	118919	28800	NA	NA	9
Fort Worth	Deer Creek Outfall	3/10/2000	63.13	NA	NA	NA	NA	NA	NA	NA
Fort Worth	Deer Creek Outfall	4/30/2000	63.13	NA	NA	NA	NA	NA	NA	NA
Fort Worth	Deer Creek Outfall	10/29/2000	63.13	1.52	3.83	347609	176400	NA	NA	6
Fort Worth	Deer Creek Outfall	11/12/2000	63.13	0.40	8.82	91476	36980	NA	NA	3
Fort Worth	Deer Creek Outfall	1/28/2001	63.13	0.29	NA	NA	NA	NA	NA	NA
Fort Worth	Deer Creek Outfall	3/8/2001	63.13	1.05	4.82	240125	126990	NA	NA	5
Fort Worth	Deer Creek Outfall	3/24/2001	63.13	1.34	NA	NA	NA	NA	NA	10
Dallas	Mountain Creek Outfall	12/2/1993	115.4	0.59	4.6	246296	39600	NA	NA	NA
Dallas	Mountain Creek Outfall	1/11/1994	115.4	0.23	11.3	96014	8530	NA	NA	NA
Dallas	Mountain Creek Outfall	2/28/1994	115.4	0.29	3.2	121061	19300	NA	NA	NA
Dallas	Mountain Creek Outfall	3/8/1994	115.4	0.20	2.8	83490	10500	NA	NA	NA
Dallas	Mountain Creek Outfall	4/11/1994	115.4	0.66	3.8	275517	21800	NA	NA	NA
Dallas	Mountain Creek Outfall	5/9/1994	115.4	0.56	1.8	233772	37600	NA	NA	NA
Dallas	Mountain Creek Outfall	8/20/1994	115.4	0.85	4.5	354833	20300	NA	NA	NA
Dallas	Mountain Creek Outfall	9/3/1997	115.4	1.32	NA	30700	NA	NA	NA	26
Dallas	Mountain Creek Outfall	10/21/1997	115.4	0.30	NA	6430	NA	NA	NA	10

City	Location	Date	Drainage Area	Rain	Duration	Rainfall volume	Runoff Volume	Flow	Intensity	Antecedent Rain
			acres	inches	hrs	ft3	ft3	cfs	in/hr	days
Dallas	Mountain Creek Outfall	12/2/1997	115.4	0.69	NA	38300	NA	NA	NA	3
Dallas	Mountain Creek Outfall	3/30/1998	115.4	0.41	NA	12100	NA	NA	NA	3
Dallas	Mountain Creek Outfall	10/2/1998	115.4	0.95	NA	NA	NA	NA	NA	NA
Dallas	Mountain Creek Outfall	11/1/1998	115.4	1.29	NA	70200	NA	NA	NA	NA
Dallas	Mountain Creek Outfall	11/29/1998	115.4	1.28	NA	NA	NA	NA	NA	NA
Dallas	Mountain Creek Outfall	3/18/1999	115.4	NA	NA	NA	NA	NA	NA	NA
Dallas	Mountain Creek Outfall	12/9/1999	115.4	0.57	0.50	237947	17700	NA	NA	39
Dallas	Mountain Creek Outfall	3/10/2000	115.4	NA	NA	NA	NA	NA	NA	NA
Dallas	Mountain Creek Outfall	4/30/2000	115.4	NA	NA	NA	NA	NA	NA	NA
Dallas	Mountain Creek Outfall	10/29/2000	115.4	1.42	2.43	592779	46098	NA	NA	7
Dallas	Mountain Creek Outfall	11/12/2000	115.4	1.27	9.47	530162	143240	NA	NA	3
Dallas	Mountain Creek Outfall	1/10/2001	115.4	NA	NA	NA	NA	NA	NA	NA
Dallas	Mountain Creek Outfall	1/16/2001	115.4	0.83	NA	NA	NA	NA	NA	NA
Dallas	Mountain Creek Outfall	1/27/2001	115.4	0.24	23.57	100188	19173	NA	NA	9
Dallas	Mountain Creek Outfall	2/9/2001	115.4	0.28	4.10	116886	11368	NA	NA	11
Dallas	Mountain Creek Outfall	2/13/2001	115.4	0.13	NA	NA	NA	NA	NA	NA
Dallas	Mountain Creek Outfall	2/27/2001	115.4	0.22	4.30	91839	7293	NA	NA	3
Dallas	Mountain Creek	3/8/2001	115.4	0.79	4.25	329786	87346	NA	NA	5

City	Location	Date	Drainage Area	Rain	Duration	Rainfall volume	Runoff Volume	Flow	Intensity	Antecedent Rain
			acres	inches	hrs	ft3	ft3	cfs	in/hr	days
	Outfall									
Fort Worth	Fish Creek Outfall	2/28/1994	12.0	0.56	4.2	83142	13100	NA	NA	NA
Fort Worth	Fish Creek Outfall	3/8/1994	12.0	0.27	4.8	40086	4834	NA	NA	NA
Fort Worth	Fish Creek Outfall	5/9/1994	12.0	0.44	4.2	65325	10400	NA	NA	NA
Fort Worth	Fish Creek Outfall	10/7/1994	12.0	1.11	3.0	164798	32200	NA	NA	NA
Fort Worth	Fish Creek Outfall	10/24/1994	12.0	0.50	3.0	74234	14400	NA	NA	NA
Fort Worth	Fish Creek Outfall	11/2/1994	12.0	0.83	3.9	123228	27400	NA	NA	NA
Fort Worth	Fish Creek Outfall	11/9/1994	12.0	0.44	2.9	65325	11300	NA	NA	NA
Dallas	Bachman Branch Outfall	12/2/1993	12.0	0.20	3.0	8712	7770	NA	NA	NA
Dallas	Bachman Branch Outfall	1/11/1994	12.0	0.22	2.3	9583	4700	NA	NA	NA
Dallas	Bachman Branch Outfall	2/28/1994	12.0	0.39	8.3	16988	11300	NA	NA	NA
Dallas	Bachman Branch Outfall	3/8/1994	12.0	0.32	3.5	13939	10200	NA	NA	NA
Dallas	Bachman Branch Outfall	4/11/1994	12.0	0.30	3.8	13068	8220	NA	NA	NA
Dallas	Bachman Branch Outfall	5/9/1994	12.0	0.23	2.3	10019	5400	NA	NA	NA
Dallas	Bachman Branch Outfall	8/5/1994	12.0	0.31	3.4	13504	11000	NA	NA	NA
Dallas	Bachman Branch Outfall	1/11/1998	12.0	0.74	NA	100000	NA	NA	NA	3
Dallas	Bachman Branch Outfall	4/14/1999	12.0	NA	NA	NA	NA	NA	NA	NA
Dallas	Bachman Branch Outfall	12/4/1999	12.0	0.35	2.70	15246	13700	NA	NA	34
Dallas	Bachman Branch Outfall	10/6/2000	12.0	0.24	13.57	10454	8991	NA	NA	12
Dallas	Bachman Branch Outfall	10/20/2000	12.0	0.23	15.17	10019	9100	NA	NA	4

City	Location	Date	Drainage Area	Rain	Duration	Rainfall volume	Runoff Volume	Flow	Intensity	Antecedent Rain
			acres	inches	hrs	ft3	ft3	cfs	in/hr	days
Dallas	Bachman Branch Outfall	11/12/2000	12.0	0.14	2.03	6098	4487	NA	NA	3
Dallas	Bachman Branch Outfall	1/10/2001	12.0	0.31	NA	NA	NA	NA	NA	NA
Dallas	Bachman Branch Outfall	2/9/2001	12.0	0.38	2.02	16553	16387	NA	NA	10
Dallas	Bachman Branch Outfall	3/8/2001	12.0	0.45	4.37	19602	19406	NA	NA	5
Austin	35th Street	9/14/1993	1.32	0.01	0.75	NA	16	NA	NA	1.8
Austin	35th Street	10/13/1993	1.32	0.06	1.00	286	74	0.03	NA	5.0
Austin	35th Street	10/20/1993	1.32	1.46	0.67	6970	1169	NA	NA	6.6
Austin	35th Street	10/20/1993	1.32	0.05	0.75	239	48	NA	NA	0.4
Austin	35th Street	10/20/1993	1.32	0.07	1.00	334	76	NA	NA	0.1
Austin	35th Street	10/29/1993	1.32	0.27	2.92	1432	1014	0.18	NA	8.0
Austin	35th Street	11/2/1993	1.32	0.35	0.83	1671	1753	0.37	NA	4.1
Austin	35th Street	12/22/1993	1.32	0.60	2.25	2864	2521	0.11	NA	3.9
Austin	35th Street	1/13/1994	1.32	0.14	0.92	668	605	0.2	NA	1.4
Austin	35th Street	1/20/1994	1.32	0.40	10.33	1909	1346	0.24	NA	6.5
Austin	35th Street	1/22/1994	1.32	0.11	3.17	527	436	0.05	NA	0.8
Austin	35th Street	2/22/1994	1.32	0.76	13.33	4535	3523	1.41	NA	1.1
Austin	35th Street	2/28/1994	1.32	0.52	13.83	2482	1919	1.05	NA	4.0
Austin	35th Street	3/9/1994	1.32	0.73	0.42	3485	5575	2.57	NA	7.2
Austin	35th Street	3/13/1994	1.32	0.34	9.92	1623	1379	0.02	NA	1.8
Austin	35th Street	3/15/1994	1.32	0.53	1.42	2530	2144	0.87	NA	2.1
Austin	35th Street	3/27/1994	1.32	0.1	0.50	477	354	0.09	NA	2.5
Austin	35th Street	4/5/1994	1.32	0.49	0.50	2339	1603	1.72	NA	9.3
Austin	35th Street	4/11/1994	1.32	0.07	3.42	334	282	0.25	NA	2.9

City	Location	Date	Drainage Area	Rain	Duration	Rainfall volume	Runoff Volume	Flow	Intensity	Antecedent Rain
			acres	inches	hrs	ft3	ft3	cfs	in/hr	days
Austin	35th Street	4/15/1994	1.32	0.17	0.42	812	513	0.73	NA	2.1
Austin	35th Street	4/19/1994	1.32	0.12	0.42	573	441	0.65	NA	4.0
Austin	35th Street	4/28/1994	1.32	0.06	0.83	286	157	1.39	NA	7.8
Austin	35th Street	4/29/1994	1.32	0.77	2.83	3676	3340	NA	NA	0.4
Austin	35th Street	5/2/1994	1.32	0.12	NA	573	433	0.65	NA	NA
Austin	35th Street	5/2/1994	1.32	0.26	NA	1241	958	NA	NA	NA
Austin	35th Street	6/3/1994	1.32	0.7	NA	3342	2863	0.67	NA	NA
Austin	35th Street	6/13/1994	1.32	0.08	NA	382	313	0.3	NA	NA
Austin	35th Street	6/14/1994	1.32	0.28	NA	1029	1010	1.56	NA	NA
Austin	35th Street	8/14/1994	1.32	0.23	NA	1102	836	1.36	NA	NA
Austin	35th Street	8/15/1994	1.32	0.48	NA	2300	1519	1.29	NA	NA
Austin	35th Street	8/21/1994	1.32	NA	NA	NA	872	0.52	NA	NA
Austin	35th Street	8/22/1994	1.32	NA	NA	NA	NA	NA	NA	NA
Austin	35th Street	9/8/1994	1.32	1.7	NA	8145	16054	5.23	NA	NA
Austin	35th Street	9/9/1994	1.32	NA	NA	NA	NA	NA	NA	NA
Austin	35th Street	9/15/1994	1.32	NA	NA	NA	2235	1.29	NA	NA
Austin	35th Street	10/7/1994	1.32	3.61	NA	17298	17059	1.27	NA	NA
Austin	35th Street	10/25/1994	1.32	2.02	NA	10023	9679	1.27	NA	NA
Austin	35th Street	10/28/1994	1.32	0.22	NA	1054	629	0.13	NA	NA
Austin	35th Street	11/15/1994	1.32	0.22	NA	1054	1153	0.26	NA	NA
Austin	35th Street	12/2/1994	1.32	0.45	NA	2156	1874	1.27	NA	NA
Austin	35th Street	12/9/1994	1.32	1	NA	4792	304	0.05	NA	NA
Austin	35th Street	12/14/1994	1.32	NA	NA	NA	NA	NA	NA	NA
Austin	35th Street	12/15/1994	1.32	1.78	NA	8529	12940	1.27	NA	NA
Austin	35th Street	2/11/1995	1.32	0.04	NA	192	345	0.19	NA	NA

City	Location	Date	Drainage Area	Rain	Duration	Rainfall volume	Runoff Volume	Flow	Intensity	Antecedent Rain
			acres	inches	hrs	ft3	ft3	cfs	in/hr	days
Austin	35th Street	2/24/1995	1.32	0.46	NA	2204	3314	1.27	NA	NA
Austin	35th Street	3/7/1995	1.32	0.12	NA	575	789	0.25	NA	NA
Austin	35th Street	3/13/1995	1.32	2.34	NA	11212	10610	1.27	NA	NA
Austin	35th Street	4/20/1995	1.32	0.54	NA	2587	1925	1.27	NA	NA
Austin	35th Street	5/8/1995	1.32	2.07	NA	9919	18986	1.27	NA	NA
Austin	35th Street	5/18/1995	1.32	0.11	NA	527	1136	1.12	NA	NA
Austin	Convict Hill	4/29/1994	0.13	0.09	0.5	41	63	NA	NA	0.5
Austin	Convict Hill	5/2/1994	0.13	0.11	3.8	69	91	NA	NA	0.3
Austin	Convict Hill	5/13/1994	0.13	1.13	0.7	518	425	NA	NA	10.9
Austin	Convict Hill	5/14/1994	0.13	0.26	0.2	119	69	NA	NA	1.3
Austin	Convict Hill	5/16/1994	0.13	0.35	1.9	160	109	NA	NA	1.0
Austin	Convict Hill	6/10/1994	0.13	0.18	0.3	82	65	NA	NA	6.3
Austin	Convict Hill	6/19/1994	0.13	0.23	0.2	105	77	NA	NA	1.0
Austin	Convict Hill	6/21/1994	0.13	0.28	0.3	128	90	NA	NA	1.8
Austin	Convict Hill	8/8/1994	0.13	0.24	0.3	110	76	NA	NA	2.0
Austin	Convict Hill	8/9/1994	0.13	3.08	1.3	1410	1199	NA	NA	0.3
Austin	Convict Hill	8/16/1994	0.13	0.32	0.9	146	132	NA	NA	7.3
Austin	Convict Hill	8/22/1994	0.13	0.24	1.6	110	84	NA	NA	0.8
Austin	Convict Hill	9/7/1994	0.13	0.17	0.5	78	78	NA	NA	6.9
Austin	Convict Hill	9/8/1994	0.13	0.36	0.1	165	175	NA	NA	0.5
Austin	Convict Hill	9/9/1994	0.13	0.94	0.6	431	411	NA	NA	0.7
Austin	Convict Hill	10/7/1994	0.13	5.51	2.2	2526	2291	NA	NA	3.1
Austin	Convict Hill	10/14/1994	0.13	0.9	3.3	411	462	NA	NA	6.5
Austin	Convict Hill	10/25/1994	0.13	1.61	1.1	739	960	NA	NA	6.6
Austin	Convict Hill	10/27/1994	0.13	0.21	8.4	96	209	NA	NA	1.8

City	Location	Date	Drainage Area	Rain	Duration	Rainfall volume	Runoff Volume	Flow	Intensity	Antecedent Rain
			acres	inches	hrs	ft3	ft3	cfs	in/hr	days
Austin	Convict Hill	11/5/1994	0.13	0.97	0.6	444	563	NA	NA	8.0
Austin	Convict Hill	11/15/1994	0.13	0.16	5.1	72	44	NA	NA	10.0
Austin	Convict Hill	12/2/1994	0.13	0.29	0.8	133	130	NA	NA	13.9
Austin	Convict Hill	12/9/1994	0.13	0.11	2.3	51	60	NA	NA	6.3
Austin	Convict Hill	12/15/1994	0.13	2.12	NA	972	1118	0.28	NA	NA
Austin	Convict Hill	1/13/1995	0.13	0.77	NA	363	257	0.35	NA	NA
Austin	Convict Hill	2/13/1995	0.13	0.11	NA	52	160	0.03	NA	NA
Austin	Convict Hill	2/24/1995	0.13	0.33	NA	155	331	0.11	NA	NA
Austin	Convict Hill	3/7/1995	0.13	0.33	NA	155	326	0.12	NA	NA
Austin	Convict Hill	3/13/1995	0.13	1.20	NA	566	533	0.27	NA	NA
Austin	Convict Hill	3/16/1995	0.13	0.23	NA	108	79	0.03	NA	NA
Austin	Convict Hill	4/4/1995	0.13	0.66	NA	311	427	0.09	NA	NA
Austin	Convict Hill	4/18/1995	0.13	0.39	NA	183	241	0.05	NA	NA
Austin	Convict Hill	4/19/1995	0.13	0.29	NA	136	118	0.11	NA	NA
Austin	Convict Hill	4/20/1995	0.13	0.75	NA	354	297	0.28	NA	NA
Austin	Convict Hill	5/8/1995	0.13	1.08	NA	509	414	0.22	NA	NA
Austin	Convict Hill	5/18/1995	0.13	0.28	NA	132	91	0.09	NA	NA
Austin	Convict Hill	2/23/2000	0.13	NA	NA	NA	NA	NA	NA	NA
Austin	Convict Hill	5/2/2000	0.13	NA	NA	NA	NA	NA	NA	NA
Austin	Convict Hill	10/7/2000	0.13	NA	NA	NA	NA	NA	NA	NA
Austin	Convict Hill	1/10/2001	0.13	NA	NA	NA	NA	NA	NA	NA
Austin	Convict Hill	5/4/2001	0.13	NA	NA	NA	NA	NA	NA	NA
Austin	Convict Hill	8/26/2001	0.13	NA	NA	NA	NA	NA	NA	NA
Austin	Convict Hill	11/15/2001	0.13	NA	NA	NA	NA	NA	NA	NA
Austin	Convict Hill	12/8/2001	0.13	NA	NA	NA	NA	NA	NA	NA

City	Location	Date	Drainage Area	Rain	Duration	Rainfall volume	Runoff Volume	Flow	Intensity	Antecedent Rain
			acres	inches	hrs	ft3	ft3	cfs	in/hr	days
Austin	Convict Hill	12/11/2001	0.13	NA	NA	NA	NA	NA	NA	NA
Austin	Convict Hill	3/19/2002	0.13	NA	NA	NA	NA	NA	NA	NA
Austin	Walnut Creek Rd	10/17/1994	0.452	0.21	12	345	NA	NA	NA	NA
Austin	Walnut Creek Rd	11/5/1994	0.452	0.21	4.5	345	NA	NA	NA	NA
Austin	Walnut Creek Rd	11/15/1994	0.452	0.20	8.8	328	NA	NA	NA	NA
Austin	Walnut Creek Rd	12/2/1994	0.452	0.20	0.9	328	NA	NA	NA	NA
Austin	Walnut Creek Rd	12/14/1994	0.452	0.12	14.8	197	NA	NA	NA	NA
Austin	Walnut Creek Rd	1/13/1995	0.452	1.42	NA	2330	NA	0.01	NA	NA
Austin	Walnut Creek Rd	2/13/1995	0.452	0.03	NA	48	NA	0.004	NA	NA
Austin	Walnut Creek Rd	2/24/1995	0.452	0.45	NA	736	NA	0.01	NA	NA
Austin	Walnut Creek Rd	3/13/1995	0.452	1.27	NA	2082	NA	0.01	NA	NA
Austin	Walnut Creek Rd	3/16/1995	0.452	0.21	NA	342	NA	0.01	NA	NA
Austin	Walnut Creek Rd	4/4/1995	0.452	0.01	NA	16	NA	0.01	NA	NA
Austin	Walnut Creek Rd	4/20/1995	0.452	0.36	NA	590	NA	0.01	NA	NA
Austin	Walnut Creek Rd	5/8/1995	0.452	2.27	NA	3719	NA	0.01	NA	NA
Austin	Walnut Creek Rd	2/29/1996	0.452	NA	NA	NA	NA	NA	NA	NA
Austin	Walnut Creek Rd	3/26/1996	0.452	0.50	NA	820	NA	NA	NA	NA
Austin	Walnut Creek Rd	4/5/1996	0.452	0.46	NA	756	NA	NA	NA	NA
Austin	Walnut Creek Rd	4/28/1996	0.452	1.03	NA	1692	NA	NA	NA	NA
Austin	Walnut Creek Rd	5/27/1996	0.452	1.43	NA	2345	NA	NA	NA	NA
Austin	Walnut Creek Rd	6/4/1996	0.452	0.34	NA	558	NA	NA	NA	NA
Austin	Walnut Creek Rd	6/22/1996	0.452	NA	NA	NA	NA	NA	NA	NA
Austin	Walnut Creek Rd	6/25/1996	0.452	NA	NA	NA	NA	NA	NA	NA
Austin	Walnut Creek Rd	8/22/1996	0.452	NA	NA	NA	NA	NA	NA	NA
Austin	Walnut Creek Rd	8/23/1996	0.452	NA	NA	NA	NA	NA	NA	NA

City	Location	Date	Drainage Area	Rain	Duration	Rainfall volume	Runoff Volume	Flow	Intensity	Antecedent Rain
			acres	inches	hrs	ft3	ft3	cfs	in/hr	days
Austin	Walnut Creek Rd	8/29/1996	0.452	NA	NA	NA	NA	NA	NA	NA
Austin	Walnut Creek Rd	10/17/1996	0.452	0.47	NA	769	191	NA	1.32	NA
Austin	Walnut Creek Rd	10/27/1996	0.452	0.27	NA	443	202	NA	1.26	NA
Austin	Walnut Creek Rd	11/7/1996	0.452	0.72	NA	1182	511	NA	0.24	NA
Austin	Walnut Creek Rd	11/24/1996	0.452	0.66	NA	1085	805	NA	0.3	NA
Austin	Walnut Creek Rd	12/4/1996	0.452	NA	NA	NA	NA	NA	NA	NA
Austin	Walnut Creek Rd	12/15/1996	0.452	1.38	NA	2267	NA	NA	0.66	NA
Austin	Walnut Creek Rd	2/6/1997	0.452	0.36	NA	591	NA	NA	NA	NA
Austin	Walnut Creek Rd	2/12/1997	0.452	1.51	NA	2477	NA	NA	NA	NA
Austin	Walnut Creek Rd	3/10/1997	0.452	0.75	NA	1230	NA	NA	NA	NA
Austin	Walnut Creek Rd	3/25/1997	0.452	0.51	NA	837	NA	NA	NA	NA
Austin	Walnut Creek Rd	4/2/1997	0.452	NA	NA	NA	NA	NA	NA	NA
Austin	Walnut Creek Rd	4/25/1997	0.452	1.36	NA	2231	NA	NA	NA	NA
Austin	Walnut Creek Rd	5/27/1997	0.452	0.65	NA	1066	NA	NA	NA	NA
Austin	Walnut Creek Swales	4/29/1994	25.847	0.57	3.7	53410	NA	0.80	NA	NA
Austin	Walnut Creek Swales	4/30/1994	25.847	0.19	1.1	17840	NA	0.32	NA	NA
Austin	Walnut Creek Swales	5/2/1994	25.847	0.33	4.7	30657	NA	0.26	NA	NA
Austin	Walnut Creek Swales	5/28/1994	25.847	0.49	0.8	45912	NA	1.45	NA	NA
Austin	Walnut Creek Swales	10/18/1994	25.847	0.59	1.0	55368	NA	0.12	NA	NA
Austin	Walnut Creek Swales	5/8/1995	25.847	1.75	NA	164145	NA	0.58	NA	NA
Austin	Walnut Creek Swales	12/20/1995	25.847	NA	NA	NA	NA	NA	NA	NA
Austin	Walnut Creek	2/29/1996	25.847	NA	NA	NA	NA	NA	NA	NA

City	Location	Date	Drainage Area	Rain	Duration	Rainfall volume	Runoff Volume	Flow	Intensity	Antecedent Rain
			acres	inches	hrs	ft3	ft3	cfs	in/hr	days
	Swales									
Austin	Walnut Creek Swales	6/4/1996	25.847	1.43	NA	134089	30406	NA	NA	NA
Austin	Walnut Creek Swales	6/7/1996	25.847	1.32	NA	123746	27228	NA	NA	NA
Austin	Walnut Creek Swales	8/11/1996	25.847	NA	NA	NA	NA	NA	NA	NA
Austin	Walnut Creek Swales	8/22/1996	25.847	NA	NA	NA	NA	NA	NA	NA
Austin	Walnut Creek Swales	8/23/1996	25.847	NA	NA	NA	NA	NA	NA	NA
Austin	Walnut Creek Swales	8/29/1996	25.847	NA	NA	NA	NA	NA	NA	NA
Austin	Walnut Creek Swales	11/24/1996	25.847	0.66	NA	62058	11265	NA	0.05	NA
Austin	Walnut Creek Swales	12/4/1996	25.847	NA	NA	NA	NA	NA	NA	NA
Austin	Walnut Creek Swales	12/15/1996	25.847	1.38	NA	129656	37222	NA	0.11	NA
Austin	Walnut Creek Swales	2/7/1997	25.847	0.36	NA	33777	8476	NA	NA	NA
Austin	Walnut Creek Swales	2/12/1997	25.847	1.51	NA	141676	59541	NA	NA	NA
Austin	Walnut Creek Swales	3/10/1997	25.847	0.75	NA	70369	8829	NA	NA	NA
Austin	Walnut Creek Swales	3/25/1997	25.847	0.51	NA	47851	7028	NA	NA	NA
Austin	Walnut Creek Swales	4/25/1997	25.847	1.36	NA	127603	28570	NA	NA	NA
Austin	Walnut Creek Swales	2/23/2000	25.847	NA	NA	NA	NA	NA	NA	NA
Austin	Walnut Creek Swales	5/2/2000	25.847	NA	NA	NA	NA	NA	NA	NA
Austin	Walnut Creek Swales	10/7/2000	25.847	NA	NA	NA	NA	NA	NA	NA

City	Location	Date	Drainage Area	Rain	Duration	Rainfall volume	Runoff Volume	Flow	Intensity	Antecedent Rain
			acres	inches	hrs	ft3	ft3	cfs	in/hr	days
Austin	Walnut Creek Swales	1/10/2001	25.847	NA	NA	NA	NA	NA	NA	NA
Austin	Walnut Creek Swales	4/23/2001	25.847	NA	NA	NA	NA	NA	NA	NA
Austin	Walnut Creek Swales	5/4/2001	25.847	NA	NA	NA	NA	NA	NA	NA
Austin	Walnut Creek Swales	8/30/2001	25.847	NA	NA	NA	NA	NA	NA	NA
Austin	Walnut Creek Swales	11/15/2001	25.847	NA	NA	NA	NA	NA	NA	NA
Austin	Walnut Creek Swales	2/5/2002	25.847	NA	NA	NA	NA	NA	NA	NA
Austin	183 Rd	5/27/1996	2.175	1.02	NA	7925	4153	NA	NA	NA
Austin	183 Rd	5/30/1996	2.175	1.09	NA	8468	6230	NA	NA	NA
Austin	183 Rd	6/22/1996	2.175	0.67	NA	5205	1356	NA	NA	NA
Austin	183 Rd	6/25/1996	2.175	0.44	NA	3474	NA	NA	NA	NA
Austin	183 Rd	8/22/1996	2.175	0.33	NA	2605	NA	NA	NA	NA
Austin	183 Rd	8/23/1996	2.175	0.41	NA	3185	540	NA	NA	NA
Austin	183 Rd	8/29/1996	2.175	0.54	NA	4195	1766	NA	NA	NA
Austin	183 Rd	9/18/1996	2.175	1.78	NA	13829	7561	NA	NA	NA
Austin	183 Rd	10/17/1996	2.175	NA	NA	NA	650	NA	NA	NA
Austin	183 Rd	10/27/1996	2.175	0.26	NA	2020	325	NA	NA	NA
Austin	183 Rd	11/7/1996	2.175	0.8	NA	6215	1593	NA	NA	NA
Austin	183 Rd	11/24/1996	2.175	0.82	NA	6371	1448	NA	NA	NA
Austin	183 Rd	12/15/1996	2.175	NA	NA	NA	NA	NA	NA	NA
Austin	183 Rd	2/12/1997	2.175	1.86	NA	14685	NA	NA	NA	NA
Austin	183 Rd	3/25/1997	2.175	0.65	NA	5132	NA	NA	NA	NA
Austin	183 Rd	4/2/1997	2.175	0.41	NA	3237	NA	NA	NA	NA

City	Location	Date	Drainage Area	Rain	Duration	Rainfall volume	Runoff Volume	Flow	Intensity	Antecedent Rain
			acres	inches	hrs	ft3	ft3	cfs	in/hr	days
Austin	183 Rd	4/25/1997	2.175	1.54	NA	12159	NA	NA	NA	NA
Austin	183 Rd	5/9/1997	2.175	1.89	NA	14922	NA	NA	NA	NA
Austin	183 Rd	5/27/1997	2.175	0.73	NA	5764	NA	NA	NA	NA
Austin	183 Swales	3/27/1996	3.212	0.42	NA	4820	2042	NA	0.24	NA
Austin	183 Swales	4/5/1996	3.212	0.6	NA	6886	4864	NA	0.24	NA
Austin	183 Swales	4/22/1996	3.212	0.37	NA	4247	919	NA	0.3	NA
Austin	183 Swales	5/27/1996	3.212	1.02	NA	11707	3212	NA	3.78	NA
Austin	183 Swales	5/30/1996	3.212	NA	NA	NA	NA	NA	NA	NA
Austin	183 Swales	6/22/1996	3.212	0.67	NA	7690	1473	NA	1.14	NA
Austin	183 Swales	6/25/1996	3.212	0.44	NA	5050	2780	NA	0.9	NA
Austin	183 Swales	8/11/1996	3.212	NA	NA	NA	NA	NA	NA	NA
Austin	183 Swales	8/22/1996	3.212	0.33	NA	3788	798	NA	1.14	NA
Austin	183 Swales	8/23/1996	3.212	0.41	NA	4706	3192	NA	0.36	NA
Austin	183 Swales	8/29/1996	3.212	0.54	NA	6198	3971	NA	1.38	NA
Austin	183 Swales	9/18/1996	3.212	1.78	NA	20430	9897	NA	2.1	NA
Austin	183 Swales	11/7/1996	3.212	NA	NA	NA	NA	NA	NA	NA
Austin	183 Swales	11/24/1996	3.212	0.82	NA	9411	7375	NA	0.72	NA
Austin	183 Swales	12/15/1996	3.212	NA	NA	NA	NA	NA	NA	NA
Austin	183 Swales	2/7/1997	3.212	0.36	NA	4132	4034	NA	0.36	NA
Austin	183 Swales	2/12/1997	3.212	1.86	NA	21348	23842	NA	1.02	NA
Austin	183 Swales	3/11/1997	3.212	0.47	NA	5394	4497	NA	0.18	NA
Austin	183 Swales	3/25/1997	3.212	0.65	NA	7460	4635	NA	0.66	NA
Austin	183 Swales	4/2/1997	3.212	NA	NA	NA	NA	NA	NA	NA
Austin	183 Swales	4/25/1997	3.212	1.54	NA	17675	10050	NA	1.86	NA
Austin	183 Swales	5/9/1997	3.212	1.89	NA	21692	11140	NA	3.6	NA

City	Location	Date	Drainage Area	Rain	Duration	Rainfall volume	Runoff Volume	Flow	Intensity	Antecedent Rain
			acres	inches	hrs	ft3	ft3	cfs	in/hr	days
Austin	183 Swales	5/27/1997	3.212	0.73	NA	8378	6432	NA	2.4	NA
Austin	Outfall 001	5/2/2000	NA	NA	NA	NA	NA	NA	NA	NA
Austin	Outfall 001	10/7/2000	NA	NA	NA	NA	NA	NA	NA	NA
Austin	Outfall 001	1/10/2001	NA	NA	NA	NA	NA	NA	NA	NA
Austin	Outfall 001	6/24/2001	NA	NA	NA	NA	NA	NA	NA	NA
Austin	Outfall 001	8/26/2001	NA	NA	NA	NA	NA	NA	NA	NA
Austin	Outfall 001	11/12/2001	NA	NA	NA	NA	NA	NA	NA	NA
Austin	Outfall 004	5/2/2000	NA	NA	NA	NA	NA	NA	NA	NA
Austin	Outfall 004	11/3/2000	NA	NA	NA	NA	NA	NA	NA	NA
Austin	Outfall 004	1/10/2001	NA	NA	NA	NA	NA	NA	NA	NA
Austin	Outfall 004	8/26/2001	NA	NA	NA	NA	NA	NA	NA	NA
Austin	Outfall 004	11/15/2001	NA	NA	NA	NA	NA	NA	NA	NA
Austin	Outfall 004	2/5/2002	NA	NA	NA	NA	NA	NA	NA	NA
Austin	Outfall 005	1/27/2000	NA	NA	NA	NA	NA	NA	NA	NA
Austin	Outfall 005	5/12/2000	NA	NA	NA	NA	NA	NA	NA	NA
Austin	Outfall 005	10/9/2000	NA	NA	NA	NA	NA	NA	NA	NA
Austin	Outfall 005	1/10/2001	NA	NA	NA	NA	NA	NA	NA	NA
Austin	Outfall 005	4/23/2001	NA	NA	NA	NA	NA	NA	NA	NA
Austin	Outfall 005	8/26/2001	NA	NA	NA	NA	NA	NA	NA	NA
Austin	Outfall 005	12/13/2001	NA	NA	NA	NA	NA	NA	NA	NA
Austin	Outfall 005	12/15/2001	NA	NA	NA	NA	NA	NA	NA	NA
Austin	Outfall 005	2/5/2002	NA	NA	NA	NA	NA	NA	NA	NA
Austin	Outfall 006	2/23/2000	NA	NA	NA	NA	NA	NA	NA	NA
Austin	Outfall 006	5/2/2000	NA	NA	NA	NA	NA	NA	NA	NA
Austin	Outfall 006	11/3/2000	NA	NA	NA	NA	NA	NA	NA	NA

City	Location	Date	Drainage Area	Rain	Duration	Rainfall volume	Runoff Volume	Flow	Intensity	Antecedent Rain
			acres	inches	hrs	ft3	ft3	cfs	in/hr	days
Austin	Outfall 006	3/2/2001	NA	NA	NA	NA	NA	NA	NA	NA
Austin	Outfall 006	8/26/2001	NA	NA	NA	NA	NA	NA	NA	NA

Table B-2: Water Quality Monitoring Data for Water Temperature, pH, BOD, COD, and Indicator Organisms

City	Location	Date	Water Temp	pH		BOD		COD		Fecal Coliform		Fecal Strep
			°C			mg/L		mg/L		CFU/100mL		CFU/100mL
Corpus Christi	TxDOT	9/14/2000	25.4	7.4	<	8		40		100000		33600
Corpus Christi	TxDOT	11/4/2000	25	6.6		12		90		200000		53600
Corpus Christi	TxDOT	12/26/2000	13.1	8.2		10		44		72000		130000
Corpus Christi	TxDOT	1/10/2001	16.7	7.8		11	<	0.5		9090		59100
Corpus Christi	TxDOT	3/2/2001	12.7	7.6		19		74		21800		23200
Corpus Christi	TxDOT	3/27/2001	19.3	8.2		10		128		2000		34500
Corpus Christi	TxDOT	5/21/2001	23.1	7.1		22		125		8000		14000
San Antonio	Leon Creek Outfall	10/17/1999	22.1	7.7	<	6.7		34		8000		NA
San Antonio	Leon Creek Outfall	2/23/2000	18.5	6.3		NA		37		3100		NA
San Antonio	Leon Creek Outfall	5/19/2000	25.25	6.1		3.8		37		7000		NA
San Antonio	Leon Creek Outfall	9/12/2000	25	8.4		5.1		31		6800		NA
San Antonio	Leon Creek Outfall	11/2/2000	NA	6		NA		18		29000		NA
Beaumont	TxDOT 001 Outfall	05/01/00 - 09/30/00	NA	NA		12		90		630		NA
Beaumont	TxDOT 001 Outfall	10/01/00 - 12/31/00	NA	NA		4.9		96		73		NA
Beaumont	TxDOT 001 Outfall	01/01/01 - 04/30/01	NA	NA		4.8		37		4500		NA

City	Location	Date	Water Temp	pH		BOD		COD		Fecal Coliform		Fecal Strep
			°C			mg/L		mg/L		CFU/100mL		CFU/100mL
Beaumont	TxDOT 001 Outfall	05/01/01 - 09/30/01	NA	NA		3		92		140		NA
Beaumont	TxDOT 002 Outfall	01/01/00 - 03/01/00	NA	NA		24		84		1200		NA
Beaumont	TxDOT 002 Outfall	05/01/00 - 09/30/00	NA	NA		3.9		39		79		NA
Beaumont	TxDOT 002 Outfall	10/01/00 - 12/31/00	NA	NA		2.7		43		13000		NA
Beaumont	TxDOT 002 Outfall	01/01/01 - 04/30/01	NA	NA		4.4		73		840		NA
Beaumont	TxDOT 002 Outfall	05/01/01 - 09/30/01	NA	NA		4.6		55		38000		NA
Houston	Loop 610	2/20/1999	17.7	7.81		13		88		30000		NA
Houston	Loop 610	4/26/1999	23.1	7.7		27		149		70000		110000
Houston	Loop 610	11/22/1999	22.7	8.5		14		115		130000		50000
Houston	Loop 610	12/9/1999	19.2	8.39		14		62		170000		30000
Houston	Loop 610	6/19/2000	26.6	8.6		18		151		550000		300000
Houston	U.S. 59	3/19/1999	19.1	7.8		5		7		5400		60000
Houston	U.S. 59	4/26/1999	22.3	8		17		119		5400		60000
Houston	U.S. 59	6/25/1999	26.4	8.3		5		49		90000		50000
Houston	U.S. 59	9/28/1999	28.4	7.8		18		101		20000		27800
Houston	U.S. 59	12/9/1999	19.5	7.9		16		127		17800		18100
Houston	U.S. 59	6/19/2000	27.7	8		10		69		150000		29600
Fort Worth	Deer Creek Outfall	5/2/1994	15.0	8		4.4		32		5000		1600
Fort Worth	Deer Creek Outfall	5/9/1994	20.0	7.2		4.4		5		330		100
Fort Worth	Deer Creek Outfall	8/21/1994	26.0	8.6		9.4		54		NA		23000
Fort Worth	Deer Creek Outfall	8/31/1994	24.0	7.8		9.4		59		170		680
Fort Worth	Deer Creek Outfall	10/7/1994	22.5	8		5.4		59		21000		10000
Fort Worth	Deer Creek Outfall	11/2/1994	20.0	7.8		4.7		35		250000		31000
Fort Worth	Deer Creek Outfall	11/9/1994	17.5	7.4		2.7		29		55000		87000
Fort Worth	Deer Creek Outfall	2/6/1997	8	7.7		5.8		44		4000		19000

City	Location	Date	Water Temp	pH		BOD		COD		Fecal Coliform		Fecal Strep
			°C			mg/L		mg/L		CFU/100mL		CFU/100mL
Fort Worth	Deer Creek Outfall	2/12/1997	10	7.2		2.8		23		120		27000
Fort Worth	Deer Creek Outfall	3/12/1997	18	8.2		4.3		33		580		19000
Fort Worth	Deer Creek Outfall	3/25/1997	17	7.9		4.6		44		2600		27000
Fort Worth	Deer Creek Outfall	4/3/1997	19	7.3		5.3		37		3300		7900
Fort Worth	Deer Creek Outfall	10/7/1997	23.5	7.4		16		51		40000		10000
Fort Worth	Deer Creek Outfall	5/27/1998	21.4	7.8		7.6		71		55000		26000
Fort Worth	Deer Creek Outfall	12/18/1998	11	8.2		8.2		5		730		6900
Fort Worth	Deer Creek Outfall	3/18/1999	16	7.4		8.3		70		9667		73000
Fort Worth	Deer Creek Outfall	9/13/1999	23.7	7.7		7.4		47		400		30
Fort Worth	Deer Creek Outfall	3/10/2000	15	NA		9.3		62.5		30		30
Fort Worth	Deer Creek Outfall	4/30/2000	NA	NA		NA		NA		NA		NA
Fort Worth	Deer Creek Outfall	10/29/2000	21.5	7.9		5.1		43		460		950
Fort Worth	Deer Creek Outfall	11/12/2000	13	8		NA		NA		100		250
Fort Worth	Deer Creek Outfall	1/28/2001	NA	NA		NA		NA		NA		NA
Fort Worth	Deer Creek Outfall	3/8/2001	12.3	8.07		5.2		61		33		100
Fort Worth	Deer Creek Outfall	3/24/2001	15	7.91		NA		NA		NA		NA
Dallas	Mountain Creek Outfall	12/2/1993	19	8.4		6.8		86		4500		28000
Dallas	Mountain Creek Outfall	1/11/1994	12	8.2		9.2		140		100		1200
Dallas	Mountain Creek Outfall	2/28/1994	11.5	7.8		8.4		87		2200		5100
Dallas	Mountain Creek Outfall	3/8/1994	16	7.5		4.3		56		1700		5800
Dallas	Mountain Creek Outfall	4/11/1994	19	8.6		6		110		8000		26000
Dallas	Mountain Creek Outfall	5/9/1994	20	7.5		6.5		49		11000		68000

City	Location	Date	Water Temp	pH		BOD		COD		Fecal Coliform		Fecal Strep
			°C			mg/L		mg/L		CFU/100mL		CFU/100mL
Dallas	Mountain Creek Outfall	8/20/1994	29	7.6		9.2		120		NA		18000
Dallas	Mountain Creek Outfall	9/3/1997	26.5	7.5		7.5		91		22000		10000
Dallas	Mountain Creek Outfall	10/21/1997	17.5	7.7		NA		63		10000		22000
Dallas	Mountain Creek Outfall	12/2/1997	12.5	7.5		4.4		34		2600		19000
Dallas	Mountain Creek Outfall	3/30/1998	18.4	7.6		14		74		61000		300000
Dallas	Mountain Creek Outfall	10/2/1998	22.6	7.7		9.6		40		160000		160000
Dallas	Mountain Creek Outfall	11/1/1998	19.6	7.7		4		20		20000		58000
Dallas	Mountain Creek Outfall	11/29/1998	16.5	7.6		6		11		14000		140000
Dallas	Mountain Creek Outfall	3/18/1999	16	7.7		7.7		16		700		6461
Dallas	Mountain Creek Outfall	12/9/1999	17.5	7.9		8		18.7		7200		21000
Dallas	Mountain Creek Outfall	3/10/2000	15.1	8.2		9.3		50.9		4600		9700
Dallas	Mountain Creek Outfall	4/30/2000	NA	NA		NA		NA		NA		NA
Dallas	Mountain Creek Outfall	10/29/2000	19.5	8.4		6.6		54		150000		520000
Dallas	Mountain Creek Outfall	11/12/2000	12.5	8.1		NA		NA		9700		10000
Dallas	Mountain Creek Outfall	1/10/2001	4	6.79		NA		NA		NA		NA
Dallas	Mountain Creek Outfall	1/16/2001	8.5	7.1		NA		NA		NA		NA
Dallas	Mountain Creek Outfall	1/27/2001	6	8.3		4		21		900		29000
Dallas	Mountain Creek	2/9/2001	13.5	7.8		NA		NA		NA		NA

City	Location	Date	Water Temp	pH		BOD		COD		Fecal Coliform		Fecal Strep
			°C			mg/L		mg/L		CFU/100mL		CFU/100mL
	Outfall											
Dallas	Mountain Creek Outfall	2/13/2001	12.5	8.95		NA		NA		NA		NA
Dallas	Mountain Creek Outfall	2/27/2001	NA	NA		NA		NA		NA		NA
Dallas	Mountain Creek Outfall	3/8/2001	14	8.8		6.2		35		33		800
Fort Worth	Fish Creek Outfall	2/28/1994	11	7.7		6		59		2100		3700
Fort Worth	Fish Creek Outfall	3/8/1994	15	7.3		6.4		70		41000		19000
Fort Worth	Fish Creek Outfall	5/9/1994	20	8.4		4.9		5		450000		150000
Fort Worth	Fish Creek Outfall	10/7/1994	22	8.4		5.4		53		90000		26000
Fort Worth	Fish Creek Outfall	10/24/1994	20	6.2		5.4		55		170000		51000
Fort Worth	Fish Creek Outfall	11/2/1994	20	7.6		6.3		31		47000		2800
Fort Worth	Fish Creek Outfall	11/9/1994	18.5	7.8		9.2		62		160000		140000
Dallas	Bachman Branch Outfall	12/2/1993	18	8		10		99		120000		100000
Dallas	Bachman Branch Outfall	1/11/1994	12	7.8		8.7		93		53000		54000
Dallas	Bachman Branch Outfall	2/28/1994	11.5	7.9		7.2		50		34000		16000
Dallas	Bachman Branch Outfall	3/8/1994	11.5	8.3		7.3		65		860000		20000
Dallas	Bachman Branch Outfall	4/11/1994	20	7.5		10		84		620000		310000
Dallas	Bachman Branch Outfall	5/9/1994	19.5	7.5		5.2		5		3200000		840000
Dallas	Bachman Branch Outfall	8/5/1994	24.5	6.7		8.3		93		250000		180000
Dallas	Bachman Branch Outfall	1/11/1998	8.5	7.4		3.3		46		14000		15000
Dallas	Bachman Branch Outfall	4/14/1999	17	7.3		8.8		93		15666		51000

City	Location	Date	Water Temp	pH		BOD		COD		Fecal Coliform		Fecal Strep
			°C			mg/L		mg/L		CFU/100mL		CFU/100mL
Dallas	Bachman Branch Outfall	12/4/1999	18	8.4		8.7		40.9		97000		50000
Dallas	Bachman Branch Outfall	10/6/2000	16	7.26		NA		79.5		370000		83000
Dallas	Bachman Branch Outfall	10/20/2000	NA	NA		14		69		NA		NA
Dallas	Bachman Branch Outfall	11/12/2000	13.5	7.6		NA		22		32000		20000
Dallas	Bachman Branch Outfall	1/10/2001	9.5	7.66		NA		NA		16000		6500
Dallas	Bachman Branch Outfall	2/9/2001	14	7.97		9.6		NA		NA		NA
Dallas	Bachman Branch Outfall	3/8/2001	13.3	7.66		11		73		410		3500
Austin	35th Street	9/14/1993	NA	NA		19		248		NA		NA
Austin	35th Street	10/13/1993	NA	NA		25		190		NA		NA
Austin	35th Street	10/20/1993	NA	NA		12		42		NA		NA
Austin	35th Street	10/20/1993	NA	NA		28		195		NA		NA
Austin	35th Street	10/20/1993	NA	NA		28		185		NA		NA
Austin	35th Street	10/29/1993	NA	NA		18		126		NA		NA
Austin	35th Street	11/2/1993	NA	NA		21		209		NA		NA
Austin	35th Street	12/22/1993	NA	NA		0		149		NA		NA
Austin	35th Street	1/13/1994	NA	NA		6		142		NA		NA
Austin	35th Street	1/20/1994	NA	NA		40		336		NA		NA
Austin	35th Street	1/22/1994	NA	NA		43		264		NA		NA
Austin	35th Street	2/22/1994	NA	NA		5		88		NA		NA
Austin	35th Street	2/28/1994	NA	NA		NA		NA		NA		NA
Austin	35th Street	3/9/1994	NA	NA		7		64		NA		NA
Austin	35th Street	3/13/1994	NA	NA		9		75		NA		NA

City	Location	Date	Water Temp	pH		BOD		COD		Fecal Coliform		Fecal Strep
			°C			mg/L		mg/L		CFU/100mL		CFU/100mL
Austin	35th Street	3/15/1994	NA	NA		9		79		NA		NA
Austin	35th Street	3/27/1994	NA	NA		15		90		NA		NA
Austin	35th Street	4/5/1994	NA	NA		23		135		NA		NA
Austin	35th Street	4/11/1994	NA	NA		23		292		NA		NA
Austin	35th Street	4/15/1994	NA	NA		22		203		NA		NA
Austin	35th Street	4/19/1994	NA	NA		NA		217		NA		NA
Austin	35th Street	4/28/1994	NA	NA		56		452		NA		NA
Austin	35th Street	4/29/1994	NA	NA		10		80		NA		NA
Austin	35th Street	5/2/1994	NA	NA		12		167		NA		NA
Austin	35th Street	5/2/1994	NA	NA		4		115		NA		NA
Austin	35th Street	6/3/1994	NA	NA		10		125		NA		NA
Austin	35th Street	6/13/1994	NA	NA		NA		124		NA		NA
Austin	35th Street	6/14/1994	NA	NA		9		41		NA		NA
Austin	35th Street	8/14/1994	NA	NA		9		94		NA		NA
Austin	35th Street	8/15/1994	NA	NA		10		70		NA		NA
Austin	35th Street	8/21/1994	26.2	7.71		22		251		1650		1450
Austin	35th Street	8/22/1994	NA	NA		15		167		NA		NA
Austin	35th Street	9/8/1994	NA	NA		37		464		NA		NA
Austin	35th Street	9/9/1994	NA	NA		14		184		NA		NA
Austin	35th Street	9/15/1994	NA	NA		9		64		NA		NA
Austin	35th Street	10/7/1994	26.6	5.98		27		209		2600		2233
Austin	35th Street	10/25/1994	NA	NA		NA		18		NA		NA
Austin	35th Street	10/28/1994	NA	NA		16		124		NA		NA
Austin	35th Street	11/15/1994	19.0	7.15		NA		135		7000		16667
Austin	35th Street	12/2/1994	NA	NA		12		65		NA		NA

City	Location	Date	Water Temp	pH		BOD		COD		Fecal Coliform		Fecal Strep
			°C			mg/L		mg/L		CFU/100mL		CFU/100mL
Austin	35th Street	12/9/1994	NA	NA		14		152		NA		NA
Austin	35th Street	12/14/1994	NA	NA		19		157		NA		NA
Austin	35th Street	12/15/1994	NA	NA		7		89		NA		NA
Austin	35th Street	2/11/1995	NA	NA		31		NA		NA		NA
Austin	35th Street	2/24/1995	NA	NA		NA		196		NA		NA
Austin	35th Street	3/7/1995	NA	NA		8		55		NA		NA
Austin	35th Street	3/13/1995	NA	NA		7		68		NA		NA
Austin	35th Street	4/20/1995	NA	NA		5		48		NA		NA
Austin	35th Street	5/8/1995	NA	NA		9		55		NA		NA
Austin	35th Street	5/18/1995	NA	NA		NA		NA		NA		NA
Austin	Convict Hill	4/29/1994	NA	NA		10		72	>	100000		20500
Austin	Convict Hill	5/2/1994	NA	NA		6		78		NA		NA
Austin	Convict Hill	5/13/1994	NA	NA		5		92		NA		NA
Austin	Convict Hill	5/14/1994	NA	NA		7		NA		400		7667
Austin	Convict Hill	5/16/1994	NA	NA		7		46		167		20667
Austin	Convict Hill	6/10/1994	NA	NA		24		174		NA		NA
Austin	Convict Hill	6/19/1994	NA	NA		5		75		NA		NA
Austin	Convict Hill	6/21/1994	NA	NA		6		68		NA		NA
Austin	Convict Hill	8/8/1994	27	5.04		13		114		0		100
Austin	Convict Hill	8/9/1994	NA	NA		3		32		1250		775
Austin	Convict Hill	8/16/1994	NA	NA		10		39		NA		NA
Austin	Convict Hill	8/22/1994	NA	NA		3		15		NA		3525
Austin	Convict Hill	9/7/1994	NA	NA		16		49		9500		4000
Austin	Convict Hill	9/8/1994	NA	NA		5		17		NA		750
Austin	Convict Hill	9/9/1994	NA	NA		3		10		NA		1475

City	Location	Date	Water Temp	pH		BOD		COD		Fecal Coliform		Fecal Strep
			°C			mg/L		mg/L		CFU/100mL		CFU/100mL
Austin	Convict Hill	10/7/1994	NA	NA		8		49		NA		NA
Austin	Convict Hill	10/14/1994	17.4	5.61		6		43		110000		90000
Austin	Convict Hill	10/25/1994	NA	NA		4		19		NA		9500
Austin	Convict Hill	10/27/1994	NA	NA		4		40		6000		20625
Austin	Convict Hill	11/5/1994	NA	NA		3		29		NA		NA
Austin	Convict Hill	11/15/1994	NA	NA		5		33		1500		3600
Austin	Convict Hill	12/2/1994	NA	NA		5		39		186667		156667
Austin	Convict Hill	12/9/1994	15.1	7.78		3		29		3767		2633
Austin	Convict Hill	12/15/1994	NA	NA		3		41		1349		2866
Austin	Convict Hill	1/13/1995	NA	NA		5		26		0		0
Austin	Convict Hill	2/13/1995	NA	NA		13		46		350		1450
Austin	Convict Hill	2/24/1995	NA	NA		NA		85		NA		NA
Austin	Convict Hill	3/7/1995	NA	NA		4		31		404		834
Austin	Convict Hill	3/13/1995	NA	NA		2		16		0		150
Austin	Convict Hill	3/16/1995	NA	NA		2		44		100		3300
Austin	Convict Hill	4/4/1995	NA	NA		5		40		2306		13266
Austin	Convict Hill	4/18/1995	NA	NA		7		38		698		19212
Austin	Convict Hill	4/19/1995	NA	NA		7		57		NA		20000
Austin	Convict Hill	4/20/1995	NA	NA		4		21		NA		NA
Austin	Convict Hill	5/8/1995	NA	NA		3		18		667		4175
Austin	Convict Hill	5/18/1995	NA	NA		NA		NA		66000		25500
Austin	Convict Hill	2/23/2000	NA	8		4		16		NA		NA
Austin	Convict Hill	5/2/2000	NA	NA		2		8		NA		NA
Austin	Convict Hill	10/7/2000	NA	NA	<	2		32		NA		NA
Austin	Convict Hill	1/10/2001	NA	NA		NA		31		NA		NA

City	Location	Date	Water Temp	pH		BOD		COD		Fecal Coliform		Fecal Strep
			°C			mg/L		mg/L		CFU/100mL		CFU/100mL
Austin	Convict Hill	5/4/2001	NA	NA	<	2		253		NA		NA
Austin	Convict Hill	8/26/2001	NA	NA	<	2		60.2		NA		NA
Austin	Convict Hill	11/15/2001	NA	NA	<	2		NA		NA		NA
Austin	Convict Hill	12/8/2001	NA	NA		NA		26		NA		NA
Austin	Convict Hill	12/11/2001	NA	NA		NA		30		NA		NA
Austin	Convict Hill	3/19/2002	NA	NA	<	2		19		NA		NA
Austin	Walnut Creek Rd	10/17/1994	NA	NA		5		42		NA		NA
Austin	Walnut Creek Rd	11/5/1994	NA	NA		3		4		NA		NA
Austin	Walnut Creek Rd	11/15/1994	NA	NA		8		71		NA		NA
Austin	Walnut Creek Rd	12/2/1994	NA	NA		9		56		NA		NA
Austin	Walnut Creek Rd	12/14/1994	NA	NA		9		84		NA		NA
Austin	Walnut Creek Rd	1/13/1995	NA	NA		4		42		NA		NA
Austin	Walnut Creek Rd	2/13/1995	NA	NA		22		99		NA		NA
Austin	Walnut Creek Rd	2/24/1995	NA	NA		NA		97		NA		NA
Austin	Walnut Creek Rd	3/13/1995	NA	NA		3		28		NA		NA
Austin	Walnut Creek Rd	3/16/1995	NA	NA		9		24		NA		NA
Austin	Walnut Creek Rd	4/4/1995	NA	NA		8		31		NA		NA
Austin	Walnut Creek Rd	4/20/1995	NA	NA		7		68		NA		NA
Austin	Walnut Creek Rd	5/8/1995	NA	NA		3		16		NA		NA
Austin	Walnut Creek Rd	2/29/1996	NA	NA		NA		107		NA		NA
Austin	Walnut Creek Rd	3/26/1996	NA	NA		NA		298		NA		NA
Austin	Walnut Creek Rd	4/5/1996	NA	NA		NA		81		NA		NA
Austin	Walnut Creek Rd	4/28/1996	NA	NA		NA		127		NA		NA
Austin	Walnut Creek Rd	5/27/1996	NA	NA		NA		59		NA		NA
Austin	Walnut Creek Rd	6/4/1996	NA	NA		NA		38		9889		3295

City	Location	Date	Water Temp	pH		BOD		COD		Fecal Coliform		Fecal Strep
			°C			mg/L		mg/L		CFU/100mL		CFU/100mL
Austin	Walnut Creek Rd	6/22/1996	NA	NA		NA		174		NA		NA
Austin	Walnut Creek Rd	6/25/1996	NA	NA		NA		85		NA		NA
Austin	Walnut Creek Rd	8/22/1996	NA	NA		NA		202		20496		2077
Austin	Walnut Creek Rd	8/23/1996	NA	NA		NA		31		NA		NA
Austin	Walnut Creek Rd	8/29/1996	NA	NA		NA		52		NA		NA
Austin	Walnut Creek Rd	10/17/1996	NA	NA		NA		145		NA		NA
Austin	Walnut Creek Rd	10/27/1996	NA	NA		NA		83		NA		3840
Austin	Walnut Creek Rd	11/7/1996	NA	NA		NA		47		NA		3085
Austin	Walnut Creek Rd	11/24/1996	NA	NA		NA		68		NA		4114
Austin	Walnut Creek Rd	12/4/1996	NA	NA		NA		63		NA		NA
Austin	Walnut Creek Rd	12/15/1996	NA	NA		NA		30		NA		4373
Austin	Walnut Creek Rd	2/6/1997	NA	NA		NA		299		NA		NA
Austin	Walnut Creek Rd	2/12/1997	NA	NA		NA		43		NA		5159
Austin	Walnut Creek Rd	3/10/1997	NA	NA		NA		112		NA		NA
Austin	Walnut Creek Rd	3/25/1997	NA	NA		NA		67		NA		NA
Austin	Walnut Creek Rd	4/2/1997	NA	NA		NA		209		NA		NA
Austin	Walnut Creek Rd	4/25/1997	NA	NA		NA		112		29253		30588
Austin	Walnut Creek Rd	5/27/1997	NA	NA		NA		83		NA		NA
Austin	Walnut Creek Swales	4/29/1994	NA	NA		NA		35	>	100000	>	100000
Austin	Walnut Creek Swales	4/30/1994	NA	NA		NA		40		NA		NA
Austin	Walnut Creek Swales	5/2/1994	NA	NA		NA		47		NA		NA
Austin	Walnut Creek Swales	5/28/1994	NA	NA		NA		30		NA		NA
Austin	Walnut Creek Swales	10/18/1994	NA	NA		NA		38		116000		80000

City	Location	Date	Water Temp	pH		BOD		COD		Fecal Coliform		Fecal Strep
			°C			mg/L		mg/L		CFU/100mL		CFU/100mL
Austin	Walnut Creek Swales	5/8/1995	NA	NA		NA		21		3600		35300
Austin	Walnut Creek Swales	12/20/1995	NA	NA		NA		46		29154		24055
Austin	Walnut Creek Swales	2/29/1996	NA	NA		NA		55		NA		28762
Austin	Walnut Creek Swales	6/4/1996	NA	NA		NA		63		NA		NA
Austin	Walnut Creek Swales	6/7/1996	NA	NA		NA		66		NA		NA
Austin	Walnut Creek Swales	8/11/1996	NA	NA		NA		67		1195878		5507
Austin	Walnut Creek Swales	8/22/1996	NA	NA		NA		66		186991		15324
Austin	Walnut Creek Swales	8/23/1996	NA	NA		NA		34		NA		NA
Austin	Walnut Creek Swales	8/29/1996	NA	NA		NA		40		NA		NA
Austin	Walnut Creek Swales	11/24/1996	NA	NA		NA		24		140348		116393
Austin	Walnut Creek Swales	12/4/1996	NA	NA		NA		28		13874		15951
Austin	Walnut Creek Swales	12/15/1996	NA	NA		NA		20		NA		NA
Austin	Walnut Creek Swales	2/7/1997	NA	NA		NA		50		NA		NA
Austin	Walnut Creek Swales	2/12/1997	NA	NA		NA		22		NA		47200
Austin	Walnut Creek Swales	3/10/1997	NA	NA		NA		28		NA		NA
Austin	Walnut Creek Swales	3/25/1997	NA	NA		NA		36		NA		NA
Austin	Walnut Creek Swales	4/25/1997	NA	NA		NA		42		8064		33900
Austin	Walnut Creek	2/23/2000	NA	7.4		6		16		NA		NA

City	Location	Date	Water Temp	pH		BOD		COD		Fecal Coliform		Fecal Strep
			°C			mg/L		mg/L		CFU/100mL		CFU/100mL
	Swales											
Austin	Walnut Creek Swales	5/2/2000	NA	NA	<	2		10		NA		NA
Austin	Walnut Creek Swales	10/7/2000	NA	NA	<	2		24		NA		NA
Austin	Walnut Creek Swales	1/10/2001	NA	NA		6		31		NA		NA
Austin	Walnut Creek Swales	4/23/2001	NA	NA		4		52.4		NA		NA
Austin	Walnut Creek Swales	5/4/2001	NA	NA	<	2		176		NA		NA
Austin	Walnut Creek Swales	8/30/2001	NA	NA	<	2		111		NA		NA
Austin	Walnut Creek Swales	11/15/2001	NA	NA	<	2		40		NA		NA
Austin	Walnut Creek Swales	2/5/2002	NA	NA	<	2		24		NA		NA
Austin	183 Rd	5/27/1996	NA	NA		NA		53		6265		56842
Austin	183 Rd	5/30/1996	NA	NA		NA		27		157726		16313
Austin	183 Rd	6/22/1996	NA	NA		NA		458		NA		NA
Austin	183 Rd	6/25/1996	NA	NA		NA		69		83202		6423
Austin	183 Rd	8/22/1996	NA	NA		NA		202		NA		NA
Austin	183 Rd	8/23/1996	NA	NA		NA		52		NA		NA
Austin	183 Rd	8/29/1996	NA	NA		NA		123		489348		4092
Austin	183 Rd	9/18/1996	NA	NA		NA		112		NA		8361
Austin	183 Rd	10/17/1996	NA	NA		NA		119		NA		NA
Austin	183 Rd	10/27/1996	NA	NA		NA		NA		17811		53399
Austin	183 Rd	11/7/1996	NA	NA		NA		11		2355		4244
Austin	183 Rd	11/24/1996	NA	NA		NA		38		2000		5137

City	Location	Date	Water Temp	pH		BOD		COD		Fecal Coliform		Fecal Strep
			°C			mg/L		mg/L		CFU/100mL		CFU/100mL
Austin	183 Rd	12/15/1996	NA	NA		NA		20		NA		NA
Austin	183 Rd	2/12/1997	NA	NA		NA		67		NA		NA
Austin	183 Rd	3/25/1997	NA	NA		NA		81		NA		NA
Austin	183 Rd	4/2/1997	NA	NA		NA		122		18363		37035
Austin	183 Rd	4/25/1997	NA	NA		NA		38		NA		NA
Austin	183 Rd	5/9/1997	NA	NA		NA		19		NA		8306
Austin	183 Rd	5/27/1997	NA	NA		NA		86		86604		57007
Austin	183 Swales	3/27/1996	NA	NA		NA		42		NA		NA
Austin	183 Swales	4/5/1996	NA	NA		NA		10		NA		NA
Austin	183 Swales	4/22/1996	NA	NA		NA		64		NA		NA
Austin	183 Swales	5/27/1996	NA	NA		NA		76		380261		4045
Austin	183 Swales	5/30/1996	NA	NA		NA		49		14804		7824
Austin	183 Swales	6/22/1996	NA	NA		NA		45		NA		NA
Austin	183 Swales	6/25/1996	NA	NA		NA		27		373030		24173
Austin	183 Swales	8/11/1996	NA	NA		NA		64		1511616		16655
Austin	183 Swales	8/22/1996	NA	NA		NA		68		NA		NA
Austin	183 Swales	8/23/1996	NA	NA		NA		48		NA		NA
Austin	183 Swales	8/29/1996	NA	NA		NA		32		145182		71121
Austin	183 Swales	9/18/1996	NA	NA		NA		24		NA		NA
Austin	183 Swales	11/7/1996	NA	NA		NA		29		NA		NA
Austin	183 Swales	11/24/1996	NA	NA		NA		24		NA		NA
Austin	183 Swales	12/15/1996	NA	NA		NA		10		NA		NA
Austin	183 Swales	2/7/1997	NA	NA		NA		41		2798		83676
Austin	183 Swales	2/12/1997	NA	NA		NA		16		NA		NA
Austin	183 Swales	3/11/1997	NA	NA		NA		35		NA		NA

City	Location	Date	Water Temp	pH		BOD		COD		Fecal Coliform		Fecal Strep
			°C			mg/L		mg/L		CFU/100mL		CFU/100mL
Austin	183 Swales	3/25/1997	NA	NA		NA		30		1823		27809
Austin	183 Swales	4/2/1997	NA	NA		NA		40		38596		101629
Austin	183 Swales	4/25/1997	NA	NA		NA		16		NA		NA
Austin	183 Swales	5/9/1997	NA	NA		NA		43		NA		26478
Austin	183 Swales	5/27/1997	NA	NA		NA		24		19077		40400
Austin	Outfall 001	5/2/2000	NA	NA		7		6		NA		NA
Austin	Outfall 001	10/7/2000	NA	NA	<	2		32		NA		NA
Austin	Outfall 001	1/10/2001	NA	NA		7		102		NA		NA
Austin	Outfall 001	6/24/2001	NA	NA		10		163		NA		NA
Austin	Outfall 001	8/26/2001	NA	NA	<	2		57.6		NA		NA
Austin	Outfall 001	11/12/2001	NA	NA	<	2		49		NA		NA
Austin	Outfall 004	5/2/2000	NA	NA		3		6		NA		NA
Austin	Outfall 004	11/3/2000	NA	NA	<	2		39		NA		NA
Austin	Outfall 004	1/10/2001	NA	NA	<	2		24		NA		NA
Austin	Outfall 004	8/26/2001	NA	NA	<	2		126		NA		NA
Austin	Outfall 004	11/15/2001	NA	NA	<	2		17		NA		NA
Austin	Outfall 004	2/5/2002	NA	NA	<	2		29		NA		NA
Austin	Outfall 005	1/27/2000	NA	NA		4		24		NA		NA
Austin	Outfall 005	5/12/2000	NA	NA		NA		32		NA		NA
Austin	Outfall 005	10/9/2000	NA	NA	<	2		8		NA		NA
Austin	Outfall 005	1/10/2001	NA	NA	<	2		24		NA		NA
Austin	Outfall 005	4/23/2001	NA	NA		NA		49.2		NA		NA
Austin	Outfall 005	8/26/2001	NA	NA	<	2		21.7		NA		NA
Austin	Outfall 005	12/13/2001	NA	NA		7		40		NA		NA
Austin	Outfall 005	12/15/2001	NA	NA	<	2		15		NA		NA

City	Location	Date	Water Temp	pH		BOD		COD		Fecal Coliform		Fecal Strep
			°C			mg/L		mg/L		CFU/100mL		CFU/100mL
Austin	Outfall 005	2/5/2002	NA	NA	<	2		24		NA		NA
Austin	Outfall 006	2/23/2000	NA	NA		NA		NA		NA		NA
Austin	Outfall 006	5/2/2000	NA	NA		3		8		NA		NA
Austin	Outfall 006	11/3/2000	NA	NA	<	2		47		NA		NA
Austin	Outfall 006	3/2/2001	NA	NA	<	2		16		NA		NA
Austin	Outfall 006	8/26/2001	NA	NA	<	2		115		NA		NA

Table B-3: Water Quality Monitoring Data for Solids, Chloride, and Sulfate

City	Location	Date	TSS		TDS		Chloride		Sulfate	
				mg/L		mg/L		mg/L		mg/L
Corpus Christi	TxDOT	9/14/2000		12		NA		NA		NA
Corpus Christi	TxDOT	11/4/2000		112		104		NA		NA
Corpus Christi	TxDOT	12/26/2000		85		168		NA		NA
Corpus Christi	TxDOT	1/10/2001		56		143		NA		NA
Corpus Christi	TxDOT	3/2/2001		68		318		NA		NA
Corpus Christi	TxDOT	3/27/2001		70		276		NA		NA
Corpus Christi	TxDOT	5/21/2001		110		269		NA		NA
San Antonio	Leon Creek Outfall	10/17/1999		43		44		NA		NA
San Antonio	Leon Creek Outfall	2/23/2000		87		16		NA		NA
San Antonio	Leon Creek Outfall	5/19/2000		193		28		NA		NA
San Antonio	Leon Creek Outfall	9/12/2000		416		31		NA		NA
San Antonio	Leon Creek Outfall	11/2/2000		168		23		NA		NA

City	Location	Date	TSS	TDS	Chloride	Sulfate
			mg/L	mg/L	mg/L	mg/L
Beaumont	TxDOT 001 Outfall	05/01/00 - 09/30/00	61	166	NA	NA
Beaumont	TxDOT 001 Outfall	10/01/00 - 12/31/00	43	208	NA	NA
Beaumont	TxDOT 001 Outfall	01/01/01 - 04/30/01	31	106	NA	NA
Beaumont	TxDOT 001 Outfall	05/01/01 - 09/30/01	15	198	NA	NA
Beaumont	TxDOT 002 Outfall	01/01/00 - 03/01/00	56	42	NA	NA
Beaumont	TxDOT 002 Outfall	05/01/00 - 09/30/00	9.4	22	NA	NA
Beaumont	TxDOT 002 Outfall	10/01/00 - 12/31/00	9.8	92	NA	NA
Beaumont	TxDOT 002 Outfall	01/01/01 - 04/30/01	35	192	NA	NA
Beaumont	TxDOT 002 Outfall	05/01/01 - 09/30/01	23	124	NA	NA
Houston	Loop 610	2/20/1999	36	144	NA	NA
Houston	Loop 610	4/26/1999	92	121	NA	NA
Houston	Loop 610	11/22/1999	1700	730	NA	NA
Houston	Loop 610	12/9/1999	54	115	NA	NA
Houston	Loop 610	6/19/2000	84	739	NA	NA
Houston	U.S. 59	3/19/1999	269	39	NA	NA
Houston	U.S. 59	4/26/1999	100	152	NA	NA
Houston	U.S. 59	6/25/1999	37	83	NA	NA
Houston	U.S. 59	9/28/1999	18	150	NA	NA
Houston	U.S. 59	12/9/1999	90	230	NA	NA
Houston	U.S. 59	6/19/2000	36	208	NA	NA
Fort Worth	Deer Creek Outfall	5/2/1994	120	177	24	23
Fort Worth	Deer Creek Outfall	5/9/1994	74	134	13	20
Fort Worth	Deer Creek Outfall	8/21/1994	46	277	62	24
Fort Worth	Deer Creek Outfall	8/31/1994	148	145	35	17
Fort Worth	Deer Creek Outfall	10/7/1994	151	102	13	14
Fort Worth	Deer Creek Outfall	11/2/1994	47	214	37	35
Fort Worth	Deer Creek Outfall	11/9/1994	21	205	33	26

City	Location	Date	TSS	TDS	Chloride	Sulfate
			mg/L	mg/L	mg/L	mg/L
Fort Worth	Deer Creek Outfall	2/6/1997	81	174	19	29
Fort Worth	Deer Creek Outfall	2/12/1997	142	104	8	12
Fort Worth	Deer Creek Outfall	3/12/1997	130	163	18	25
Fort Worth	Deer Creek Outfall	3/25/1997	57	177	18	51
Fort Worth	Deer Creek Outfall	4/3/1997	238	270	43	40
Fort Worth	Deer Creek Outfall	10/7/1997	22	201	43	26
Fort Worth	Deer Creek Outfall	5/27/1998	98	123	15	15
Fort Worth	Deer Creek Outfall	12/18/1998	88	172	21	29
Fort Worth	Deer Creek Outfall	3/18/1999	78	178	19.5	23
Fort Worth	Deer Creek Outfall	9/13/1999	62	278	35.4	70.9
Fort Worth	Deer Creek Outfall	3/10/2000	332	142	15.1	23.8
Fort Worth	Deer Creek Outfall	4/30/2000	NA	NA	NA	NA
Fort Worth	Deer Creek Outfall	10/29/2000	614	45	5.99	11.2
Fort Worth	Deer Creek Outfall	11/12/2000	NA	NA	NA	NA
Fort Worth	Deer Creek Outfall	1/28/2001	NA	NA	NA	NA
Fort Worth	Deer Creek Outfall	3/8/2001	120	210	6.94	12
Fort Worth	Deer Creek Outfall	3/24/2001	NA	NA	NA	NA
Dallas	Mountain Creek Outfall	12/2/1993	136	699	23	370
Dallas	Mountain Creek Outfall	1/11/1994	102	750	11	420
Dallas	Mountain Creek Outfall	2/28/1994	386	456	6.6	260
Dallas	Mountain Creek Outfall	3/8/1994	73	647	10	350
Dallas	Mountain Creek Outfall	4/11/1994	211	309	36	170
Dallas	Mountain Creek Outfall	5/9/1994	58	372	3.6	200
Dallas	Mountain Creek Outfall	8/20/1994	164	240	5.2	110
Dallas	Mountain Creek Outfall	9/3/1997	146	264	3	130
Dallas	Mountain Creek Outfall	10/21/1997	44	451	6.1	240
Dallas	Mountain Creek Outfall	12/2/1997	13	513	5.3	280

City	Location	Date	TSS		TDS		Chloride		Sulfate	
				mg/L		mg/L		mg/L		mg/L
Dallas	Mountain Creek Outfall	3/30/1998		138		634		6.8		360
Dallas	Mountain Creek Outfall	10/2/1998		336		168		2.6		69
Dallas	Mountain Creek Outfall	11/1/1998		290		448		3.1		240
Dallas	Mountain Creek Outfall	11/29/1998		448		252		2.1		130
Dallas	Mountain Creek Outfall	3/18/1999		50		932		13.2		486
Dallas	Mountain Creek Outfall	12/9/1999		496		144		2.65		48.6
Dallas	Mountain Creek Outfall	3/10/2000		300		300		3.2		163
Dallas	Mountain Creek Outfall	4/30/2000		NA		NA		NA		NA
Dallas	Mountain Creek Outfall	10/29/2000		1114		149		2.17		69.5
Dallas	Mountain Creek Outfall	11/12/2000		NA		NA		NA		NA
Dallas	Mountain Creek Outfall	1/10/2001		NA		NA		NA		NA
Dallas	Mountain Creek Outfall	1/16/2001		NA		NA		NA		NA
Dallas	Mountain Creek Outfall	1/27/2001		14		1980		15.2		1310
Dallas	Mountain Creek Outfall	2/9/2001		NA		NA		NA		NA
Dallas	Mountain Creek Outfall	2/13/2001		NA		NA		NA		NA
Dallas	Mountain Creek Outfall	2/27/2001		NA		NA		NA		NA
Dallas	Mountain Creek Outfall	3/8/2001		152		530		2.87		238
Fort Worth	Fish Creek Outfall	2/28/1994		67		103		3.7		17
Fort Worth	Fish Creek Outfall	3/8/1994		90		267		7.6		100
Fort Worth	Fish Creek Outfall	5/9/1994		30		140		3.3		27
Fort Worth	Fish Creek Outfall	10/7/1994		105		101		3.3		25
Fort Worth	Fish Creek Outfall	10/24/1994		104		86		1.7		11
Fort Worth	Fish Creek Outfall	11/2/1994		36		73		1.4		9.5
Fort Worth	Fish Creek Outfall	11/9/1994		138		93		2.9		9.7
Dallas	Bachman Branch Outfall	12/2/1993		136		184		24		28
Dallas	Bachman Branch Outfall	1/11/1994		42		185		10		57
Dallas	Bachman Branch Outfall	2/28/1994		44		94		6.4		18

City	Location	Date	TSS		TDS		Chloride		Sulfate	
				mg/L		mg/L		mg/L		mg/L
Dallas	Bachman Branch Outfall	3/8/1994		104		92		4		18
Dallas	Bachman Branch Outfall	4/11/1994		60		125		4.4		37
Dallas	Bachman Branch Outfall	5/9/1994		NA		NA		NA		NA
Dallas	Bachman Branch Outfall	8/5/1994		17		229		5.7		80
Dallas	Bachman Branch Outfall	1/11/1998		78		108		12		14
Dallas	Bachman Branch Outfall	4/14/1999		143		114		5.48		27.7
Dallas	Bachman Branch Outfall	12/4/1999		209		178		11.5		37.9
Dallas	Bachman Branch Outfall	10/6/2000		45		380		21.8		109
Dallas	Bachman Branch Outfall	10/20/2000		154		258		10.4		58.2
Dallas	Bachman Branch Outfall	11/12/2000		134		147		7.8		52.5
Dallas	Bachman Branch Outfall	1/10/2001		NA		NA		NA		NA
Dallas	Bachman Branch Outfall	2/9/2001		NA		NA		NA		NA
Dallas	Bachman Branch Outfall	3/8/2001		68		378		15.6		91.1
Austin	35th Street	9/14/1993		58		NA		NA		NA
Austin	35th Street	10/13/1993		106		NA		NA		NA
Austin	35th Street	10/20/1993		385		NA		NA		NA
Austin	35th Street	10/20/1993		157		NA		NA		NA
Austin	35th Street	10/20/1993		116		NA		NA		NA
Austin	35th Street	10/29/1993		147		NA		NA		NA
Austin	35th Street	11/2/1993		175		NA		NA		NA
Austin	35th Street	12/22/1993		48		NA		NA		NA
Austin	35th Street	1/13/1994		123		NA		NA		NA
Austin	35th Street	1/20/1994		286		NA		NA		NA
Austin	35th Street	1/22/1994		79		NA		NA		NA
Austin	35th Street	2/22/1994		370		NA		NA		NA
Austin	35th Street	2/28/1994		NA		NA		NA		NA
Austin	35th Street	3/9/1994		NA		NA		NA		NA

City	Location	Date	TSS		TDS		Chloride		Sulfate	
				mg/L		mg/L		mg/L		mg/L
Austin	35th Street	3/13/1994		40		NA		NA		NA
Austin	35th Street	3/15/1994		313		NA		NA		NA
Austin	35th Street	3/27/1994		131		NA		NA		NA
Austin	35th Street	4/5/1994		808		NA		NA		NA
Austin	35th Street	4/11/1994		540		NA		NA		NA
Austin	35th Street	4/15/1994		914		NA		NA		NA
Austin	35th Street	4/19/1994		NA		NA		NA		NA
Austin	35th Street	4/28/1994		126		NA		NA		NA
Austin	35th Street	4/29/1994		266		NA		NA		NA
Austin	35th Street	5/2/1994		33		NA		NA		NA
Austin	35th Street	5/2/1994		184		NA		NA		NA
Austin	35th Street	6/3/1994		287		NA		NA		NA
Austin	35th Street	6/13/1994		372		NA		NA		NA
Austin	35th Street	6/14/1994		110		NA		NA		NA
Austin	35th Street	8/14/1994		105		NA		NA		NA
Austin	35th Street	8/15/1994		67		NA		NA		NA
Austin	35th Street	8/21/1994		48		235		NA		NA
Austin	35th Street	8/22/1994		58		NA		NA		NA
Austin	35th Street	9/8/1994		91		NA		NA		NA
Austin	35th Street	9/9/1994		27		NA		NA		NA
Austin	35th Street	9/15/1994		160		NA		NA		NA
Austin	35th Street	10/7/1994		93		90		NA		NA
Austin	35th Street	10/25/1994		NA		NA		NA		NA
Austin	35th Street	10/28/1994		129		NA		NA		NA
Austin	35th Street	11/15/1994		96		165		NA		NA
Austin	35th Street	12/2/1994		205		NA		NA		NA
Austin	35th Street	12/9/1994		20		NA		NA		NA

City	Location	Date	TSS		TDS		Chloride		Sulfate	
				mg/L		mg/L		mg/L		mg/L
Austin	35th Street	12/14/1994		80		NA		NA		NA
Austin	35th Street	12/15/1994		88		NA		NA		NA
Austin	35th Street	2/11/1995		128		NA		NA		NA
Austin	35th Street	2/24/1995		336		NA		NA		NA
Austin	35th Street	3/7/1995		57		NA		NA		NA
Austin	35th Street	3/13/1995		225		NA		NA		NA
Austin	35th Street	4/20/1995		218		NA		NA		NA
Austin	35th Street	5/8/1995		165		NA		NA		NA
Austin	35th Street	5/18/1995		NA		NA		NA		NA
Austin	Convict Hill	4/29/1994		239		NA		NA		NA
Austin	Convict Hill	5/2/1994		86		NA		NA		NA
Austin	Convict Hill	5/13/1994		403		NA		NA		NA
Austin	Convict Hill	5/14/1994		348		NA		NA		NA
Austin	Convict Hill	5/16/1994		6		NA		NA		NA
Austin	Convict Hill	6/10/1994		512		NA		NA		NA
Austin	Convict Hill	6/19/1994		4		NA		NA		NA
Austin	Convict Hill	6/21/1994		40		NA		NA		NA
Austin	Convict Hill	8/8/1994		176		115		NA		NA
Austin	Convict Hill	8/9/1994		42		NA		NA		NA
Austin	Convict Hill	8/16/1994		80		NA		NA		NA
Austin	Convict Hill	8/22/1994		40		NA		NA		NA
Austin	Convict Hill	9/7/1994		292		NA		NA		NA
Austin	Convict Hill	9/8/1994		0		NA		NA		NA
Austin	Convict Hill	9/9/1994		3		NA		NA		NA
Austin	Convict Hill	10/7/1994		68		NA		NA		NA
Austin	Convict Hill	10/14/1994		24		75		NA		NA
Austin	Convict Hill	10/25/1994		146		NA		NA		NA

City	Location	Date	TSS		TDS		Chloride		Sulfate	
				mg/L		mg/L		mg/L		mg/L
Austin	Convict Hill	10/27/1994		68		NA		NA		NA
Austin	Convict Hill	11/5/1994		192		NA		NA		NA
Austin	Convict Hill	11/15/1994		12		NA		NA		NA
Austin	Convict Hill	12/2/1994		156		NA		NA		NA
Austin	Convict Hill	12/9/1994		136		60		NA		NA
Austin	Convict Hill	12/15/1994		96		NA		NA		NA
Austin	Convict Hill	1/13/1995		346		NA		NA		NA
Austin	Convict Hill	2/13/1995		24		NA		NA		NA
Austin	Convict Hill	2/24/1995		245		NA		NA		NA
Austin	Convict Hill	3/7/1995		147		NA		NA		NA
Austin	Convict Hill	3/13/1995		118		NA		NA		NA
Austin	Convict Hill	3/16/1995		148		NA		NA		NA
Austin	Convict Hill	4/4/1995		153		NA		NA		NA
Austin	Convict Hill	4/18/1995		86		NA		NA		NA
Austin	Convict Hill	4/19/1995		260		NA		NA		NA
Austin	Convict Hill	4/20/1995		198		NA		NA		NA
Austin	Convict Hill	5/8/1995		85		NA		NA		NA
Austin	Convict Hill	5/18/1995		NA		NA		NA		NA
Austin	Convict Hill	2/23/2000		11		73		2		9
Austin	Convict Hill	5/2/2000		25		87		2		1.2
Austin	Convict Hill	10/7/2000		5		127		3		7
Austin	Convict Hill	1/10/2001		4	<	2		8		8
Austin	Convict Hill	5/4/2001		9		117		5		7
Austin	Convict Hill	8/26/2001		9		158		4		11
Austin	Convict Hill	11/15/2001		48		51	<	2	<	2
Austin	Convict Hill	12/8/2001		NA		NA		NA		NA
Austin	Convict Hill	12/11/2001		NA		NA		NA		NA

City	Location	Date	TSS		TDS		Chloride		Sulfate	
				mg/L		mg/L		mg/L		mg/L
Austin	Convict Hill	3/19/2002		15		88		4		10
Austin	Walnut Creek Rd	10/17/1994		216		NA		NA		NA
Austin	Walnut Creek Rd	11/5/1994		24		NA		NA		NA
Austin	Walnut Creek Rd	11/15/1994		40		NA		NA		NA
Austin	Walnut Creek Rd	12/2/1994		100		NA		NA		NA
Austin	Walnut Creek Rd	12/14/1994		42		NA		NA		NA
Austin	Walnut Creek Rd	1/13/1995		24		NA		NA		NA
Austin	Walnut Creek Rd	2/13/1995		44		NA		NA		NA
Austin	Walnut Creek Rd	2/24/1995		143		NA		NA		NA
Austin	Walnut Creek Rd	3/13/1995		128		NA		NA		NA
Austin	Walnut Creek Rd	3/16/1995		240		NA		NA		NA
Austin	Walnut Creek Rd	4/4/1995		190		NA		NA		NA
Austin	Walnut Creek Rd	4/20/1995		128		NA		NA		NA
Austin	Walnut Creek Rd	5/8/1995		33		NA		NA		NA
Austin	Walnut Creek Rd	2/29/1996		257		NA		NA		NA
Austin	Walnut Creek Rd	3/26/1996		479		NA		NA		NA
Austin	Walnut Creek Rd	4/5/1996		432		NA		NA		NA
Austin	Walnut Creek Rd	4/28/1996		383		NA		NA		NA
Austin	Walnut Creek Rd	5/27/1996		111		NA		NA		NA
Austin	Walnut Creek Rd	6/4/1996		23		NA		NA		NA
Austin	Walnut Creek Rd	6/22/1996		104		NA		NA		NA
Austin	Walnut Creek Rd	6/25/1996		93		NA		NA		NA
Austin	Walnut Creek Rd	8/22/1996		26		NA		NA		NA
Austin	Walnut Creek Rd	8/23/1996		23		NA		NA		NA
Austin	Walnut Creek Rd	8/29/1996		13		NA		NA		NA
Austin	Walnut Creek Rd	10/17/1996		276		NA		NA		NA
Austin	Walnut Creek Rd	10/27/1996		21		NA		NA		NA

City	Location	Date	TSS		TDS		Chloride		Sulfate	
				mg/L		mg/L		mg/L		mg/L
Austin	Walnut Creek Rd	11/7/1996		36		NA		NA		NA
Austin	Walnut Creek Rd	11/24/1996		98		NA		NA		NA
Austin	Walnut Creek Rd	12/4/1996		227		NA		NA		NA
Austin	Walnut Creek Rd	12/15/1996		54		NA		NA		NA
Austin	Walnut Creek Rd	2/6/1997		226		NA		NA		NA
Austin	Walnut Creek Rd	2/12/1997		147		NA		NA		NA
Austin	Walnut Creek Rd	3/10/1997		526		NA		NA		NA
Austin	Walnut Creek Rd	3/25/1997		256		NA		NA		NA
Austin	Walnut Creek Rd	4/2/1997		295		NA		NA		NA
Austin	Walnut Creek Rd	4/25/1997		113		NA		NA		NA
Austin	Walnut Creek Rd	5/27/1997		329		NA		NA		NA
Austin	Walnut Creek Swales	4/29/1994		62		NA		NA		NA
Austin	Walnut Creek Swales	4/30/1994		15		NA		NA		NA
Austin	Walnut Creek Swales	5/2/1994		19		NA		NA		NA
Austin	Walnut Creek Swales	5/28/1994		10		NA		NA		NA
Austin	Walnut Creek Swales	10/18/1994		55		NA		NA		NA
Austin	Walnut Creek Swales	5/8/1995		20		NA		NA		NA
Austin	Walnut Creek Swales	12/20/1995		59		NA		NA		NA
Austin	Walnut Creek Swales	2/29/1996		51		NA		NA		NA
Austin	Walnut Creek Swales	6/4/1996		24		NA		NA		NA
Austin	Walnut Creek Swales	6/7/1996		41		NA		NA		NA
Austin	Walnut Creek Swales	8/11/1996		95		NA		NA		NA
Austin	Walnut Creek Swales	8/22/1996		6		NA		NA		NA
Austin	Walnut Creek Swales	8/23/1996		4		NA		NA		NA
Austin	Walnut Creek Swales	8/29/1996		3		NA		NA		NA
Austin	Walnut Creek Swales	11/24/1996		17		NA		NA		NA
Austin	Walnut Creek Swales	12/4/1996		16		NA		NA		NA

City	Location	Date	TSS		TDS		Chloride		Sulfate	
				mg/L		mg/L		mg/L		mg/L
Austin	Walnut Creek Swales	12/15/1996		8		NA		NA		NA
Austin	Walnut Creek Swales	2/7/1997		38		NA		NA		NA
Austin	Walnut Creek Swales	2/12/1997		14		NA		NA		NA
Austin	Walnut Creek Swales	3/10/1997		60		NA		NA		NA
Austin	Walnut Creek Swales	3/25/1997		5		NA		NA		NA
Austin	Walnut Creek Swales	4/25/1997		13		NA		NA		NA
Austin	Walnut Creek Swales	2/23/2000		12		99		5		18
Austin	Walnut Creek Swales	5/2/2000		3		444		18		125
Austin	Walnut Creek Swales	10/7/2000	<	1		266		4		82
Austin	Walnut Creek Swales	1/10/2001		25		105		3		19
Austin	Walnut Creek Swales	4/23/2001		9		265		7		92
Austin	Walnut Creek Swales	5/4/2001		2		1120		9		654
Austin	Walnut Creek Swales	8/30/2001		3		430		10		136
Austin	Walnut Creek Swales	11/15/2001		4		226		9		56
Austin	Walnut Creek Swales	2/5/2002		8		126		3		37
Austin	183 Rd	5/27/1996		127		NA		NA		NA
Austin	183 Rd	5/30/1996		7		NA		NA		NA
Austin	183 Rd	6/22/1996		247		NA		NA		NA
Austin	183 Rd	6/25/1996		117		NA		NA		NA
Austin	183 Rd	8/22/1996		31		NA		NA		NA
Austin	183 Rd	8/23/1996		17		NA		NA		NA
Austin	183 Rd	8/29/1996		22		NA		NA		NA
Austin	183 Rd	9/18/1996		135		NA		NA		NA
Austin	183 Rd	10/17/1996		64		NA		NA		NA
Austin	183 Rd	10/27/1996		312		NA		NA		NA
Austin	183 Rd	11/7/1996		81		NA		NA		NA
Austin	183 Rd	11/24/1996		40		NA		NA		NA

City	Location	Date	TSS		TDS		Chloride		Sulfate	
				mg/L		mg/L		mg/L		mg/L
Austin	183 Rd	12/15/1996		98		NA		NA		NA
Austin	183 Rd	2/12/1997		133		NA		NA		NA
Austin	183 Rd	3/25/1997		328		NA		NA		NA
Austin	183 Rd	4/2/1997		522		NA		NA		NA
Austin	183 Rd	4/25/1997		146		NA		NA		NA
Austin	183 Rd	5/9/1997		389		NA		NA		NA
Austin	183 Rd	5/27/1997		159		NA		NA		NA
Austin	183 Swales	3/27/1996		4		NA		NA		NA
Austin	183 Swales	4/5/1996		18		NA		NA		NA
Austin	183 Swales	4/22/1996		5		NA		NA		NA
Austin	183 Swales	5/27/1996		56		NA		NA		NA
Austin	183 Swales	5/30/1996		56		NA		NA		NA
Austin	183 Swales	6/22/1996		38		NA		NA		NA
Austin	183 Swales	6/25/1996		50		NA		NA		NA
Austin	183 Swales	8/11/1996		58		NA		NA		NA
Austin	183 Swales	8/22/1996		3		NA		NA		NA
Austin	183 Swales	8/23/1996		5		NA		NA		NA
Austin	183 Swales	8/29/1996		59		NA		NA		NA
Austin	183 Swales	9/18/1996		7		NA		NA		NA
Austin	183 Swales	11/7/1996		14		NA		NA		NA
Austin	183 Swales	11/24/1996		6		NA		NA		NA
Austin	183 Swales	12/15/1996		7		NA		NA		NA
Austin	183 Swales	2/7/1997		7		NA		NA		NA
Austin	183 Swales	2/12/1997		5		NA		NA		NA
Austin	183 Swales	3/11/1997		17		NA		NA		NA
Austin	183 Swales	3/25/1997		6		NA		NA		NA
Austin	183 Swales	4/2/1997		6		NA		NA		NA

City	Location	Date	TSS		TDS		Chloride		Sulfate	
				mg/L		mg/L		mg/L		mg/L
Austin	183 Swales	4/25/1997		4		NA		NA		NA
Austin	183 Swales	5/9/1997		21		NA		NA		NA
Austin	183 Swales	5/27/1997		19		NA		NA		NA
Austin	Outfall 001	5/2/2000		14		72		2		1.6
Austin	Outfall 001	10/7/2000		44		126		3		7
Austin	Outfall 001	1/10/2001		127		159		4		27
Austin	Outfall 001	6/24/2001	<	1		263		9		19
Austin	Outfall 001	8/26/2001		27		95		3	<	2
Austin	Outfall 001	11/12/2001		23		119		8		7
Austin	Outfall 004	5/2/2000		14		150		8		8.8
Austin	Outfall 004	11/3/2000		66		98		3		6
Austin	Outfall 004	1/10/2001		8		79		2		6
Austin	Outfall 004	8/26/2001		27		264		13		13
Austin	Outfall 004	11/15/2001		44		57	<	2		2
Austin	Outfall 004	2/5/2002		6		122		4		8
Austin	Outfall 005	1/27/2000		9		73		4		6
Austin	Outfall 005	5/12/2000		8		89		3		8
Austin	Outfall 005	10/9/2000		18		96		4		13
Austin	Outfall 005	1/10/2001		69		73		3		10
Austin	Outfall 005	4/23/2001		NA		NA		NA		NA
Austin	Outfall 005	8/26/2001		34		72		3	<	2
Austin	Outfall 005	12/13/2001		120		94	<	2		6
Austin	Outfall 005	12/15/2001		165		71		2	<	2
Austin	Outfall 005	2/5/2002		64		75		2		5
Austin	Outfall 006	2/23/2000		NA		NA		NA		NA
Austin	Outfall 006	5/2/2000		6		134		4		1.6
Austin	Outfall 006	11/3/2000		13		104		4		3

City	Location	Date	TSS		TDS		Chloride		Sulfate	
				mg/L		mg/L		mg/L		mg/L
Austin	Outfall 006	3/2/2001		1		318		15		16
Austin	Outfall 006	8/26/2001		27		212		6		11

Table B-4: Water Quality Monitoring Data for Nutrients

City	Location	Date	TKN		Total Nitrate including nitrite for some cases		Ammonia		Nitrite		TN		TP		DP	
				mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L
Corpus Christi	TxDOT	9/14/2000		0.9		0.14	<	0.1		NA		1.04	<	0.07	<	0.07
Corpus Christi	TxDOT	11/4/2000		2.6		0.33		0.3		NA		2.9		0.62		0.33
Corpus Christi	TxDOT	12/26/2000		1.8		0.3		0.2		NA		2.1		0.52		0.38
Corpus Christi	TxDOT	1/10/2001		1.4		0.7		0.5		NA		2.1		0.1		0.09
Corpus Christi	TxDOT	3/2/2001		2.7		1.1		0.5		NA		3.8		1.8		0.8
Corpus Christi	TxDOT	3/27/2001		3.6		1.65		1.8		NA		5.2		0.25		0.09
Corpus Christi	TxDOT	5/21/2001		2.2		0.7		0.9		NA		2.9		0.3		0.2
San Antonio	Leon Creek Outfall	10/17/1999		1		NA		NA		NA		1.4		0.194		0.1
San Antonio	Leon Creek Outfall	2/23/2000		1.2		NA		NA		NA		1.3		0.213		0.048
San Antonio	Leon Creek Outfall	5/19/2000		1.3		NA		NA		NA		1.5		0.336		0.074
San Antonio	Leon Creek Outfall	9/12/2000		2.3		NA		0.136		NA		2.4		0.551		0.12
San Antonio	Leon Creek Outfall	11/2/2000		0.99		NA		0.165		NA		1.1		0.213		0.067
Beaumont	TxDOT 001 Outfall	05/01/00 - 09/30/00		1.2		1.1		1.57		0.058		NA		0.31		0.27
Beaumont	TxDOT 001 Outfall	10/01/00 - 12/31/00		0.2		NA		0.12		ND		NA		0.53		0.44
Beaumont	TxDOT 001 Outfall	01/01/01 - 04/30/01		1.1		0.3		0.26		0		NA		0.24		0
Beaumont	TxDOT 001 Outfall	05/01/01 - 09/30/01		0.7		0.12		0		0		NA		0.16		0
Beaumont	TxDOT 002 Outfall	01/01/00 - 03/01/00		1.04		0.6		1		0.015		NA		0.37		0.3

City	Location	Date	TKN		Total Nitrate including nitrite for some cases		Ammonia		Nitrite		TN		TP		DP	
				mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L
Beaumont	TxDOT 002 Outfall	05/01/00 - 09/30/00		0.6		0.8		0.14		0.016		NA		0.39		0.26
Beaumont	TxDOT 002 Outfall	10/01/00 - 12/31/00		0.4		0.15		0		0		NA		0.22		0.2
Beaumont	TxDOT 002 Outfall	01/01/01 - 04/30/01		1		0.31		0		0		NA		0.2		0
Beaumont	TxDOT 002 Outfall	05/01/01 - 09/30/01		0.5		0.18		0		0		NA		0.16		0
Houston	Loop 610	2/20/1999		2.3		1.4		0.4	<	0.1		3.7		0.72		0.54
Houston	Loop 610	4/26/1999		2.85		0.97		0.6	<	0.1	<	3.82		0.46		0.32
Houston	Loop 610	11/22/1999		5.65		0.645		NA		NA		6.29		0.54		0.3
Houston	Loop 610	12/9/1999		1.46		0.861		NA		NA		2.32		0.22		0.17
Houston	Loop 610	6/19/2000		2.8		1.3		0.4		NA		4.1		0.24		0.15
Houston	U.S. 59	3/19/1999		0.75		0.41		0.7	<	0.1	<	1.16		0.3		0.023
Houston	U.S. 59	4/26/1999		2.36		1.17		0.5		0.11		3.64		0.3		0.22
Houston	U.S. 59	6/25/1999		0.909		NA	<	0.2		NA		1.321		0.18		0.13
Houston	U.S. 59	9/28/1999		2.84		2.41		NA		NA		5.25		0.3		0.22
Houston	U.S. 59	12/9/1999		2.22		2.67		NA		NA		4.49		0.25		0.17
Houston	U.S. 59	6/19/2000		1.2		0.55	<	0.2		NA		1.75		0.17		0.09
Fort Worth	Deer Creek Outfall	5/2/1994		0.6		0.42		NA		NA		1.02		0.06		0.04
Fort Worth	Deer Creek Outfall	5/9/1994		0.7		0.35		NA		NA		1.05		0.12		0.1
Fort Worth	Deer Creek Outfall	8/21/1994		0.9		1.1		NA		NA		2		0.08		0.08
Fort Worth	Deer Creek Outfall	8/31/1994		1.1		0.72		NA		NA		1.82		0.14		0.09
Fort Worth	Deer Creek Outfall	10/7/1994		1		0.6		NA		NA		1.6		0.15		0.06
Fort Worth	Deer Creek Outfall	11/2/1994		0.6		0.88		NA		NA		1.48		0.08		0.06
Fort Worth	Deer Creek Outfall	11/9/1994		0.4		0.42		NA		NA		0.82		0.06		0.02
Fort Worth	Deer Creek Outfall	2/6/1997		0.7		0.79		NA		NA		1.49		0.04		0.03
Fort Worth	Deer Creek Outfall	2/12/1997		0.5		0.68		NA		NA		1.18		0.04		0.01
Fort Worth	Deer Creek Outfall	3/12/1997		0.8		0.44		NA		NA		1.24		0.06		0.02

City	Location	Date	TKN	Total Nitrate including nitrite for some cases	Ammonia	Nitrite	TN	TP	DP
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Fort Worth	Deer Creek Outfall	3/25/1997	1.8	0.48	NA	NA	2.28	0.33	0.14
Fort Worth	Deer Creek Outfall	4/3/1997	0.65	0.545	NA	NA	1.195	0.063	0.018
Fort Worth	Deer Creek Outfall	10/7/1997	NA	NA	NA	NA	NA	NA	NA
Fort Worth	Deer Creek Outfall	5/27/1998	NA	NA	NA	NA	NA	NA	NA
Fort Worth	Deer Creek Outfall	12/18/1998	1.7	1.02	NA	NA	2.72	0.169	0.056
Fort Worth	Deer Creek Outfall	3/18/1999	6	0.72	NA	NA	6.72	0.75	0.015
Fort Worth	Deer Creek Outfall	9/13/1999	2	1.98	NA	NA	3.98	0.11	0.05
Fort Worth	Deer Creek Outfall	3/10/2000	0.15	0.95	NA	NA	1.1	0.55	0.11
Fort Worth	Deer Creek Outfall	4/30/2000	1.8	0.89	NA	NA	2.69	0.54	0.15
Fort Worth	Deer Creek Outfall	10/29/2000	1.53	0.5	NA	NA	2.03	0.39	0.04
Fort Worth	Deer Creek Outfall	11/12/2000	1.79	0.12	NA	NA	1.91	0.18	0.01
Fort Worth	Deer Creek Outfall	1/28/2001	NA	NA	NA	NA	NA	NA	NA
Fort Worth	Deer Creek Outfall	3/8/2001	0.1	0.61	NA	NA	0.71	0.39	0.07
Fort Worth	Deer Creek Outfall	3/24/2001	NA	NA	NA	NA	NA	NA	NA
Dallas	Mountain Creek Outfall	12/2/1993	1.8	0.49	NA	NA	2.29	0.2	0.03
Dallas	Mountain Creek Outfall	1/11/1994	2.9	1.3	NA	NA	4.2	0.25	0.05
Dallas	Mountain Creek Outfall	2/28/1994	2.1	0.32	NA	NA	2.42	0.43	0.02
Dallas	Mountain Creek Outfall	3/8/1994	1.2	0.4	NA	NA	1.6	0.09	0.02
Dallas	Mountain Creek Outfall	4/11/1994	3.2	0.31	NA	NA	3.51	0.53	0.05
Dallas	Mountain Creek Outfall	5/9/1994	1.8	0.16	NA	NA	1.96	0.11	0.01
Dallas	Mountain Creek Outfall	8/20/1994	3.6	0.83	NA	NA	4.43	0.56	0.21
Dallas	Mountain Creek Outfall	9/3/1997	5.6	1.37	NA	NA	6.97	1.09	0.123

City	Location	Date	TKN	Total Nitrate including nitrite for some cases	Ammonia	Nitrite	TN	TP	DP
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Dallas	Mountain Creek Outfall	10/21/1997	2	0.811	NA	NA	2.811	0.198	0.075
Dallas	Mountain Creek Outfall	12/2/1997	0.98	0.449	NA	NA	1.429	0.086	0.064
Dallas	Mountain Creek Outfall	3/30/1998	2.2	0.504	NA	NA	2.704	0.246	0.028
Dallas	Mountain Creek Outfall	10/2/1998	5.8	1.98	NA	NA	7.78	1.69	0.15
Dallas	Mountain Creek Outfall	11/1/1998	2.1	1.3	NA	NA	3.4	0.394	0.066
Dallas	Mountain Creek Outfall	11/29/1998	2.9	0.423	NA	NA	3.323	1.47	0.054
Dallas	Mountain Creek Outfall	3/18/1999	3	0.23	NA	NA	3.23	1	0.015
Dallas	Mountain Creek Outfall	12/9/1999	8.8	0.34	NA	NA	9.14	0.06	0.11
Dallas	Mountain Creek Outfall	3/10/2000	0.15	0.47	NA	NA	0.62	0.61	0.05
Dallas	Mountain Creek Outfall	4/30/2000	NA	NA	NA	NA	NA	NA	NA
Dallas	Mountain Creek Outfall	10/29/2000	3.55	0.41	NA	NA	3.96	2.29	0.03
Dallas	Mountain Creek Outfall	11/12/2000	NA	NA	NA	NA	NA	NA	NA
Dallas	Mountain Creek Outfall	1/10/2001	NA	NA	NA	NA	NA	NA	NA
Dallas	Mountain Creek Outfall	1/16/2001	NA	NA	NA	NA	NA	NA	NA
Dallas	Mountain Creek Outfall	1/27/2001	0.1	0.3	NA	NA	0.4	0.01	0.01
Dallas	Mountain Creek Outfall	2/9/2001	NA	NA	NA	NA	NA	NA	NA
Dallas	Mountain Creek Outfall	2/13/2001	NA	NA	NA	NA	NA	NA	NA
Dallas	Mountain Creek	2/27/2001	NA	NA	NA	NA	NA	NA	NA

City	Location	Date	TKN	Total Nitrate including nitrite for some cases	Ammonia	Nitrite	TN	TP	DP
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
	Outfall								
Dallas	Mountain Creek Outfall	3/8/2001	0.1	0.15	NA	NA	0.25	0.32	0.01
Fort Worth	Fish Creek Outfall	2/28/1994	1	0.88	NA	NA	1.88	0.38	0.32
Fort Worth	Fish Creek Outfall	3/8/1994	1.3	1.3	NA	NA	2.6	0.25	0.2
Fort Worth	Fish Creek Outfall	5/9/1994	1.2	0.43	NA	NA	1.63	0.31	0.22
Fort Worth	Fish Creek Outfall	10/7/1994	1.2	1.4	NA	NA	2.6	0.36	0.27
Fort Worth	Fish Creek Outfall	10/24/1994	1.2	1.1	NA	NA	2.3	0.41	0.3
Fort Worth	Fish Creek Outfall	11/2/1994	0.9	0.66	NA	NA	1.56	0.44	0.38
Fort Worth	Fish Creek Outfall	11/9/1994	1.2	0.6	NA	NA	1.8	0.68	0.53
Dallas	Bachman Branch Outfall	12/2/1993	1.4	0.72	NA	NA	2.12	0.42	0.25
Dallas	Bachman Branch Outfall	1/11/1994	2.4	1.4	NA	NA	3.8	0.26	0.15
Dallas	Bachman Branch Outfall	2/28/1994	1.3	0.52	NA	NA	1.82	0.19	0.12
Dallas	Bachman Branch Outfall	3/8/1994	1.2	0.38	NA	NA	1.58	0.22	0.08
Dallas	Bachman Branch Outfall	4/11/1994	1.4	0.8	NA	NA	2.2	0.18	0.18
Dallas	Bachman Branch Outfall	5/9/1994	1.3	0.75	NA	NA	2.05	0.17	0.16
Dallas	Bachman Branch Outfall	8/5/1994	1.8	1.7	NA	NA	3.5	0.16	0.14
Dallas	Bachman Branch Outfall	1/11/1998	0.99	0.224	NA	NA	1.214	0.209	0.08
Dallas	Bachman Branch Outfall	4/14/1999	3.1	0.73	NA	NA	3.83	0.22	0.04
Dallas	Bachman Branch Outfall	12/4/1999	2.3	1.1	NA	NA	3.4	0.48	0.21
Dallas	Bachman Branch Outfall	10/6/2000	5.24	3.4	NA	NA	8.64	0.03	0.04

City	Location	Date	TKN	Total Nitrate including nitrite for some cases	Ammonia	Nitrite	TN	TP	DP
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Dallas	Bachman Branch Outfall	10/20/2000	3.01	3.23	NA	NA	6.24	0.44	0.025
Dallas	Bachman Branch Outfall	11/12/2000	0.14	1.15	NA	NA	1.29	0.12	0.02
Dallas	Bachman Branch Outfall	1/10/2001	NA	NA	NA	NA	NA	NA	NA
Dallas	Bachman Branch Outfall	2/9/2001	NA	NA	NA	NA	NA	NA	NA
Dallas	Bachman Branch Outfall	3/8/2001	2.1	1.46	NA	NA	3.56	0.25	0.01
Austin	35th Street	9/14/1993	NA	2.74	NA	NA	NA	0.61	NA
Austin	35th Street	10/13/1993	NA	3.26	NA	NA	NA	0.61	NA
Austin	35th Street	10/20/1993	NA	0.52	NA	NA	NA	0.30	NA
Austin	35th Street	10/20/1993	NA	1.11	NA	NA	NA	0.50	NA
Austin	35th Street	10/20/1993	NA	1.07	NA	NA	NA	0.47	NA
Austin	35th Street	10/29/1993	NA	0.84	NA	NA	NA	0.33	NA
Austin	35th Street	11/2/1993	NA	2.11	NA	NA	NA	0.39	NA
Austin	35th Street	12/22/1993	NA	1.32	NA	NA	NA	0.30	NA
Austin	35th Street	1/13/1994	NA	1.41	NA	NA	NA	0.15	NA
Austin	35th Street	1/20/1994	NA	3.44	NA	NA	NA	1.04	NA
Austin	35th Street	1/22/1994	NA	2.36	NA	NA	NA	0.51	NA
Austin	35th Street	2/22/1994	NA	0.37	NA	NA	NA	0.33	NA
Austin	35th Street	2/28/1994	NA	0.43	NA	NA	NA	NA	NA
Austin	35th Street	3/9/1994	NA	0.49	NA	NA	NA	0.27	NA
Austin	35th Street	3/13/1994	NA	1.08	NA	NA	NA	0.12	NA
Austin	35th Street	3/15/1994	NA	0.41	NA	NA	NA	0.30	NA
Austin	35th Street	3/27/1994	NA	1.03	NA	NA	NA	NA	NA
Austin	35th Street	4/5/1994	NA	0.73	NA	NA	NA	0.70	NA

City	Location	Date	TKN		Total Nitrate including nitrite for some cases		Ammonia		Nitrite		TN		TP		DP	
				mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L
Austin	35th Street	4/11/1994		NA		0.96		NA		NA		NA		0.73		NA
Austin	35th Street	4/15/1994		NA		0.00		NA		NA		NA		0.93		NA
Austin	35th Street	4/19/1994		NA		1.39		NA		NA		NA		0.76		NA
Austin	35th Street	4/28/1994		NA		3.66		NA		NA		NA		1.09		NA
Austin	35th Street	4/29/1994		NA		0.62		NA		NA		NA		0.39		NA
Austin	35th Street	5/2/1994		NA		0.902		NA		NA		NA		NA		NA
Austin	35th Street	5/2/1994		NA		0.360		NA		NA		NA		0.24		NA
Austin	35th Street	6/3/1994		NA		0.922		NA		NA		NA		0.41		NA
Austin	35th Street	6/13/1994		NA		0.000		NA		NA		NA		0.91		NA
Austin	35th Street	6/14/1994		NA		0.620		NA		NA		NA		0.34		NA
Austin	35th Street	8/14/1994		NA		1.35		NA		NA		NA		0.33		NA
Austin	35th Street	8/15/1994		NA		1.40		NA		NA		NA		0.23		NA
Austin	35th Street	8/21/1994		3.00		NA		NA		NA		NA		0.34		0.23
Austin	35th Street	8/22/1994		NA		1.02		NA		NA		NA		0.30		NA
Austin	35th Street	9/8/1994		NA		3.65		NA		NA		NA		0.60		NA
Austin	35th Street	9/9/1994		NA		1.94		NA		NA		NA		0.19		NA
Austin	35th Street	9/15/1994		NA		0.25		NA		NA		NA		0.42		NA
Austin	35th Street	10/7/1994		2.34	<	1.76		NA		NA		NA		0.60		0.23
Austin	35th Street	10/25/1994		NA		NA		NA		NA		NA		0.07		NA
Austin	35th Street	10/28/1994		NA		NA		NA		NA		NA		0.25		NA
Austin	35th Street	11/15/1994		3.72		NA		NA		NA		NA		0.26		0.03
Austin	35th Street	12/2/1994		NA		0.48		NA		NA		NA		0.30		NA
Austin	35th Street	12/9/1994		NA		2.20		NA		NA		NA		0.19		NA
Austin	35th Street	12/14/1994		NA		1.32		NA		NA		NA		0.31		NA
Austin	35th Street	12/15/1994		NA		0.44		NA		NA		NA		0.22		NA

City	Location	Date	TKN		Total Nitrate including nitrite for some cases		Ammonia		Nitrite		TN		TP		DP	
				mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L
Austin	35th Street	2/11/1995		NA		NA		NA		NA		NA		0.78		NA
Austin	35th Street	2/24/1995		NA		2.27		NA		NA		NA		0.65		NA
Austin	35th Street	3/7/1995		NA		1.43		NA		NA		NA		0.18		NA
Austin	35th Street	3/13/1995		NA		0.63		NA		NA		NA		0.25		NA
Austin	35th Street	4/20/1995		NA		0.21		NA		NA		NA		0.19		NA
Austin	35th Street	5/8/1995		NA		NA		NA		NA		NA		0.33		NA
Austin	35th Street	5/18/1995		NA		NA		NA		NA		NA		0.00		NA
Austin	Convict Hill	4/29/1994		NA		1.47		NA		NA		NA		0.06		NA
Austin	Convict Hill	5/2/1994		NA		0.89		NA		NA		NA		0.11		NA
Austin	Convict Hill	5/13/1994		NA		0.71		NA		NA		NA		0.26		NA
Austin	Convict Hill	5/14/1994		NA		0.78		NA		NA		NA		0.36		NA
Austin	Convict Hill	5/16/1994		NA		0.75		NA		NA		NA		0.08		NA
Austin	Convict Hill	6/10/1994		NA		NA		NA		NA		NA		0.38		NA
Austin	Convict Hill	6/19/1994		NA		0.60		NA		NA		NA		NA		NA
Austin	Convict Hill	6/21/1994		NA		1.61		NA		NA		NA		0.11		NA
Austin	Convict Hill	8/8/1994		1.47		NA		NA		NA		NA		0.20		0.11
Austin	Convict Hill	8/9/1994		NA		0.21		NA		NA		NA		0.05		NA
Austin	Convict Hill	8/16/1994		NA		1.80		NA		NA		NA		NA		NA
Austin	Convict Hill	8/22/1994		NA		0.43		NA		NA		NA		0.06		NA
Austin	Convict Hill	9/7/1994		NA		1.02		NA		NA		NA		0.08		NA
Austin	Convict Hill	9/8/1994		NA		0.53		NA		NA		NA		0.03		NA
Austin	Convict Hill	9/9/1994		NA		0.40		NA		NA		NA		0.03		NA
Austin	Convict Hill	10/7/1994		NA		0.60		NA		NA		NA		0.08		NA
Austin	Convict Hill	10/14/1994	<	1.2		0.78		NA		NA		NA		0.03		0.01
Austin	Convict Hill	10/25/1994		NA		NA		NA		NA		NA		0.04		NA

City	Location	Date	TKN		Total Nitrate including nitrite for some cases		Ammonia		Nitrite		TN		TP		DP	
				mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L
Austin	Convict Hill	10/27/1994		NA		NA		NA		NA		NA		0.11		NA
Austin	Convict Hill	11/5/1994		NA		NA		NA		NA		NA		0.08		NA
Austin	Convict Hill	11/15/1994		NA		NA		NA		NA		NA		0.06		NA
Austin	Convict Hill	12/2/1994		NA		0.39		NA		NA		NA		0.07		NA
Austin	Convict Hill	12/9/1994		0.56		0.55		NA		NA		NA	<	0.01	<	0.01
Austin	Convict Hill	12/15/1994		NA		0.23		NA		NA		NA		0.14		NA
Austin	Convict Hill	1/13/1995		NA		0.18		NA		NA		NA		0.14		NA
Austin	Convict Hill	2/13/1995		NA		1.75		NA		NA		NA		0.13		NA
Austin	Convict Hill	2/24/1995		NA		1.37		NA		NA		NA		0.19		NA
Austin	Convict Hill	3/7/1995		NA		1.24		NA		NA		NA		0.12		NA
Austin	Convict Hill	3/13/1995		NA		5.50		NA		NA		NA		0.09		NA
Austin	Convict Hill	3/16/1995		NA		1.75		NA		NA		NA		0.16		NA
Austin	Convict Hill	4/4/1995		NA		0.20		NA		NA		NA		0.19		NA
Austin	Convict Hill	4/18/1995		NA		0.79		NA		NA		NA		0.20		NA
Austin	Convict Hill	4/19/1995		NA		0.35		NA		NA		NA		0.26		NA
Austin	Convict Hill	4/20/1995		NA		0.11		NA		NA		NA		0.13		NA
Austin	Convict Hill	5/8/1995		NA		NA		NA		NA		NA		NA		NA
Austin	Convict Hill	5/18/1995		NA		NA		NA		NA		NA		NA		NA
Austin	Convict Hill	2/23/2000		1.44		0.36		NA		NA		NA	<	0.005	<	0.005
Austin	Convict Hill	5/2/2000		0.83		0.59		NA		NA		NA		0.013		0
Austin	Convict Hill	10/7/2000		1.26		0.41		NA		NA		NA		0.174		0.158
Austin	Convict Hill	1/10/2001		0.71		0.27		NA		NA		NA		0.174		NA
Austin	Convict Hill	5/4/2001		1.94		0.41		NA		NA		NA		0.326		0.049
Austin	Convict Hill	8/26/2001		1.27		0.41		NA		NA		NA		0.066		0.035
Austin	Convict Hill	11/15/2001		NA		NA		NA		NA		NA		NA		0.168

City	Location	Date	TKN	Total Nitrate including nitrite for some cases	Ammonia	Nitrite	TN	TP	DP
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Austin	Convict Hill	12/8/2001	0.91	0.66	NA	NA	NA	0.1	NA
Austin	Convict Hill	12/11/2001	0.83	0.14	NA	NA	NA	0.057	NA
Austin	Convict Hill	3/19/2002	0.73	0.71	NA	NA	NA	0.085	0.059
Austin	Walnut Creek Rd	10/17/1994	NA	0.26	NA	NA	NA	0.17	NA
Austin	Walnut Creek Rd	11/5/1994	NA	NA	NA	NA	NA	0.04	NA
Austin	Walnut Creek Rd	11/15/1994	NA	NA	NA	NA	NA	0.19	NA
Austin	Walnut Creek Rd	12/2/1994	NA	0.35	NA	NA	NA	0.14	NA
Austin	Walnut Creek Rd	12/14/1994	NA	1.19	NA	NA	NA	0.17	NA
Austin	Walnut Creek Rd	1/13/1995	NA	1.60	NA	NA	NA	0.05	NA
Austin	Walnut Creek Rd	2/13/1995	NA	NA	NA	NA	NA	0.16	NA
Austin	Walnut Creek Rd	2/24/1995	NA	1.60	NA	NA	NA	0.20	NA
Austin	Walnut Creek Rd	3/13/1995	NA	0.34	NA	NA	NA	0.11	NA
Austin	Walnut Creek Rd	3/16/1995	NA	1.40	NA	NA	NA	0.22	NA
Austin	Walnut Creek Rd	4/4/1995	NA	0.76	NA	NA	NA	0.21	NA
Austin	Walnut Creek Rd	4/20/1995	NA	0.43	NA	NA	NA	0.17	NA
Austin	Walnut Creek Rd	5/8/1995	NA	NA	NA	NA	NA	NA	NA
Austin	Walnut Creek Rd	2/29/1996	1.224	0.67	NA	NA	NA	0.33	NA
Austin	Walnut Creek Rd	3/26/1996	4.360	5.34	NA	NA	NA	0.39	NA
Austin	Walnut Creek Rd	4/5/1996	NA	NA	NA	NA	NA	0.02	NA
Austin	Walnut Creek Rd	4/28/1996	NA	4.27	NA	NA	NA	0.26	NA
Austin	Walnut Creek Rd	5/27/1996	NA	0.78	NA	NA	NA	0.15	NA
Austin	Walnut Creek Rd	6/4/1996	NA	0.72	NA	NA	NA	0.11	NA
Austin	Walnut Creek Rd	6/22/1996	3.200	4.74	NA	NA	NA	0.23	NA
Austin	Walnut Creek Rd	6/25/1996	2.143	4.12	NA	NA	NA	0.28	NA
Austin	Walnut Creek Rd	8/22/1996	1.593	1.16	NA	NA	NA	0.48	NA

City	Location	Date	TKN	Total Nitrate including nitrite for some cases	Ammonia	Nitrite	TN	TP	DP
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Austin	Walnut Creek Rd	8/23/1996	3.035	0.45	NA	NA	NA	0.21	NA
Austin	Walnut Creek Rd	8/29/1996	1.514	4.39	NA	NA	NA	0.10	NA
Austin	Walnut Creek Rd	10/17/1996	5.119	1.28	NA	NA	NA	0.19	NA
Austin	Walnut Creek Rd	10/27/1996	2.422	0.79	NA	NA	NA	0.14	NA
Austin	Walnut Creek Rd	11/7/1996	0.927	0.89	NA	NA	NA	0.18	NA
Austin	Walnut Creek Rd	11/24/1996	2.050	1.01	NA	NA	NA	0.16	NA
Austin	Walnut Creek Rd	12/4/1996	1.794	1.21	NA	NA	NA	NA	NA
Austin	Walnut Creek Rd	12/15/1996	0.809	0.95	NA	NA	NA	0.07	NA
Austin	Walnut Creek Rd	2/6/1997	7.129	NA	NA	NA	NA	0.43	NA
Austin	Walnut Creek Rd	2/12/1997	1.729	1.14	NA	NA	NA	0.15	NA
Austin	Walnut Creek Rd	3/10/1997	1.849	NA	NA	NA	NA	0.39	NA
Austin	Walnut Creek Rd	3/25/1997	1.948	1.00	NA	NA	NA	0.35	NA
Austin	Walnut Creek Rd	4/2/1997	3.925	1.57	NA	NA	NA	0.63	NA
Austin	Walnut Creek Rd	4/25/1997	3.002	3.37	NA	NA	NA	0.25	NA
Austin	Walnut Creek Rd	5/27/1997	2.434	0.72	NA	NA	NA	0.01	NA
Austin	Walnut Creek Swales	4/29/1994	NA	0.49	NA	NA	NA	0.22	NA
Austin	Walnut Creek Swales	4/30/1994	NA	0.45	NA	NA	NA	0.12	NA
Austin	Walnut Creek Swales	5/2/1994	NA	0.28	NA	NA	NA	0.10	NA
Austin	Walnut Creek Swales	5/28/1994	NA	0.87	NA	NA	NA	0.10	NA
Austin	Walnut Creek Swales	10/18/1994	NA	0.20	NA	NA	NA	0.09	NA
Austin	Walnut Creek Swales	5/8/1995	NA	NA	NA	NA	NA	NA	NA
Austin	Walnut Creek Swales	12/20/1995	0.501	0.50	NA	NA	NA	0.22	NA
Austin	Walnut Creek Swales	2/29/1996	0.904	1.07	NA	NA	NA	0.04	NA
Austin	Walnut Creek Swales	6/4/1996	2.735	3.69	NA	NA	NA	0.18	NA
Austin	Walnut Creek Swales	6/7/1996	2.111	2.53	NA	NA	NA	0.22	NA

City	Location	Date	TKN		Total Nitrate including nitrite for some cases		Ammonia		Nitrite		TN		TP		DP	
				mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L
Austin	Walnut Creek Swales	8/11/1996		2.987		0.89		NA		NA		NA		0.30		NA
Austin	Walnut Creek Swales	8/22/1996		2.107		3.49		NA		NA		NA		0.21		NA
Austin	Walnut Creek Swales	8/23/1996		0.921		0.36		NA		NA		NA		0.19		NA
Austin	Walnut Creek Swales	8/29/1996		2.065		0.85		NA		NA		NA		0.13		NA
Austin	Walnut Creek Swales	11/24/1996		0.690		0.50		NA		NA		NA		0.19		NA
Austin	Walnut Creek Swales	12/4/1996		0.970		1.03		NA		NA		NA		0.13		NA
Austin	Walnut Creek Swales	12/15/1996		0.900		0.51		NA		NA		NA		NA		NA
Austin	Walnut Creek Swales	2/7/1997		1.627		1.27		NA		NA		NA		0.16		NA
Austin	Walnut Creek Swales	2/12/1997		0.982		1.45		NA		NA		NA		0.11		NA
Austin	Walnut Creek Swales	3/10/1997		1.416		NA		NA		NA		NA		0.15		NA
Austin	Walnut Creek Swales	3/25/1997		1.012		0.83		NA		NA		NA		0.16		NA
Austin	Walnut Creek Swales	4/25/1997		1.295		0.22		NA		NA		NA		0.16		NA
Austin	Walnut Creek Swales	2/23/2000		1.68		0.39		NA		NA		NA	<	0.005	<	0.005
Austin	Walnut Creek Swales	5/2/2000		0.99		0.89		NA		NA		NA		0.052		0.049
Austin	Walnut Creek Swales	10/7/2000		1.42		0.65		NA		NA		NA		0.113		0.091
Austin	Walnut Creek Swales	1/10/2001		1.01		0.22		NA		NA		NA		0.119		0.013
Austin	Walnut Creek Swales	4/23/2001		1.11		0.93		NA		NA		NA		0.057		0.007
Austin	Walnut Creek Swales	5/4/2001		0.59		0.1		NA		NA		NA		0.01	<	0.005
Austin	Walnut Creek Swales	8/30/2001		0.91		1.07		NA		NA		NA		0.039		0.03
Austin	Walnut Creek Swales	11/15/2001		0.79		0.88		NA		NA		NA		0.085		0.053
Austin	Walnut Creek Swales	2/5/2002		1.73		0.43		NA		NA		NA		0.08		0.058
Austin	183 Rd	5/27/1996		NA		1.21		NA		NA		NA		0.45		NA
Austin	183 Rd	5/30/1996		NA		5.21		NA		NA		NA		0.36		NA
Austin	183 Rd	6/22/1996		5.922		3.29		NA		NA		NA		0.60		NA
Austin	183 Rd	6/25/1996		1.868		5.66		NA		NA		NA		0.35		NA

City	Location	Date	TKN	Total Nitrate including nitrite for some cases	Ammonia	Nitrite	TN	TP	DP
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Austin	183 Rd	8/22/1996	2.993	2.66	NA	NA	NA	0.51	NA
Austin	183 Rd	8/23/1996	1.199	0.8	NA	NA	NA	0.20	NA
Austin	183 Rd	8/29/1996	0.378	1.12	NA	NA	NA	0.38	NA
Austin	183 Rd	9/18/1996	2.206	2.25	NA	NA	NA	0.39	NA
Austin	183 Rd	10/17/1996	3.029	1.15	NA	NA	NA	1.07	NA
Austin	183 Rd	10/27/1996	5.569	0.47	NA	NA	NA	2.01	NA
Austin	183 Rd	11/7/1996	0.616	0.53	NA	NA	NA	0.16	NA
Austin	183 Rd	11/24/1996	0.590	0.41	NA	NA	NA	0.43	NA
Austin	183 Rd	12/15/1996	0.885	0.55	NA	NA	NA	NA	NA
Austin	183 Rd	2/12/1997	1.346	0.46	NA	NA	NA	0.27	NA
Austin	183 Rd	3/25/1997	2.055	0.43	NA	NA	NA	0.58	NA
Austin	183 Rd	4/2/1997	0.308	1.63	NA	NA	NA	0.69	NA
Austin	183 Rd	4/25/1997	2.455	2.47	NA	NA	NA	0.56	NA
Austin	183 Rd	5/9/1997	3.249	0.91	NA	NA	NA	0.68	NA
Austin	183 Rd	5/27/1997	2.176	0.94	NA	NA	NA	0.30	NA
Austin	183 Swales	3/27/1996	0.262	0.65	NA	NA	NA	0.20	NA
Austin	183 Swales	4/5/1996	NA	NA	NA	NA	NA	0.19	NA
Austin	183 Swales	4/22/1996	NA	0.80	NA	NA	NA	0.33	NA
Austin	183 Swales	5/27/1996	NA	0.54	NA	NA	NA	0.95	NA
Austin	183 Swales	5/30/1996	NA	4.61	NA	NA	NA	0.28	NA
Austin	183 Swales	6/22/1996	1.966	2.71	NA	NA	NA	0.46	NA
Austin	183 Swales	6/25/1996	1.728	3.71	NA	NA	NA	0.24	NA
Austin	183 Swales	8/11/1996	7.066	0.64	NA	NA	NA	0.42	NA
Austin	183 Swales	8/22/1996	1.832	0.31	NA	NA	NA	0.35	NA
Austin	183 Swales	8/23/1996	1.176	0.20	NA	NA	NA	0.21	NA

City	Location	Date	TKN		Total Nitrate including nitrite for some cases		Ammonia		Nitrite		TN		TP		DP	
				mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L
Austin	183 Swales	8/29/1996		1.003		1.40		NA		NA		NA		0.32		NA
Austin	183 Swales	9/18/1996		0.901		1.32		NA		NA		NA		0.32		NA
Austin	183 Swales	11/7/1996		0.775		0.20		NA		NA		NA		0.43		NA
Austin	183 Swales	11/24/1996		0.874		0.25		NA		NA		NA		0.21		NA
Austin	183 Swales	12/15/1996		0.630		0.19		NA		NA		NA		NA		NA
Austin	183 Swales	2/7/1997		1.299		1.12		NA		NA		NA		0.27		NA
Austin	183 Swales	2/12/1997		1.001		0.78		NA		NA		NA		0.15		NA
Austin	183 Swales	3/11/1997		1.206		0.17		NA		NA		NA		0.25		NA
Austin	183 Swales	3/25/1997		1.326		0.41		NA		NA		NA		NA		NA
Austin	183 Swales	4/2/1997		1.066		0.68		NA		NA		NA		0.28		NA
Austin	183 Swales	4/25/1997		1.039		0.32		NA		NA		NA		0.18		NA
Austin	183 Swales	5/9/1997		1.397		0.42		NA		NA		NA		NA		NA
Austin	183 Swales	5/27/1997		1.122		0.48		NA		NA		NA		0.19		NA
Austin	Outfall 001	5/2/2000		1.06		0.27		NA		NA		NA		0.111		0.069
Austin	Outfall 001	10/7/2000		3.68		0.75		NA		NA		NA		0.157		0.152
Austin	Outfall 001	1/10/2001		1.29		0.96		NA		NA		NA		0.034		0.007
Austin	Outfall 001	6/24/2001		2.05		0.46		NA		NA		NA		0.218		NA
Austin	Outfall 001	8/26/2001		1.7		0.32		NA		NA		NA		0.193		0.12
Austin	Outfall 001	11/12/2001		0.94		0.52		NA		NA		NA		0.102		0.03
Austin	Outfall 004	5/2/2000		0.93		0.49		NA		NA		NA	<	0.005		0
Austin	Outfall 004	11/3/2000		1.06		0.18		NA		NA		NA		0.565		0.361
Austin	Outfall 004	1/10/2001		0.92		0.03		NA		NA		NA		0.174		0.017
Austin	Outfall 004	8/26/2001		4.99		0.34		NA		NA		NA		0.864		0.751
Austin	Outfall 004	11/15/2001		0.67		0.06		NA		NA		NA		0.166		0.126
Austin	Outfall 004	2/5/2002		1.24		0.66		NA		NA		NA		0.219		0.203

City	Location	Date	TKN		Total Nitrate including nitrite for some cases		Ammonia		Nitrite		TN		TP		DP	
				mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L
Austin	Outfall 005	1/27/2000		1.33		0.55		NA		NA		NA		0.037		NA
Austin	Outfall 005	5/12/2000		1.05		0.87		NA		NA		NA		0.134		NA
Austin	Outfall 005	10/9/2000		1.4		0.39		NA		NA		NA		0.106	<	0.005
Austin	Outfall 005	1/10/2001		0.76		0.23		NA		NA		NA		0.101		0.013
Austin	Outfall 005	4/23/2001		1.48		0.56		NA		NA		NA		0.204		NA
Austin	Outfall 005	8/26/2001		0.99		0.38		NA		NA		NA		0.229		0.158
Austin	Outfall 005	12/13/2001		1.24		0.28		NA		NA		NA		0.021		0.02
Austin	Outfall 005	12/15/2001		0.64		0.11		NA		NA		NA		0.137		0.088
Austin	Outfall 005	2/5/2002		1.79		0.68		NA		NA		NA		0.147		0.121
Austin	Outfall 006	2/23/2000		NA		NA		NA		NA		NA		NA		NA
Austin	Outfall 006	5/2/2000		0.91		0.16		NA		NA		NA		0.105		0.098
Austin	Outfall 006	11/3/2000		1.04		0.13		NA		NA		NA		0.097		0.039
Austin	Outfall 006	3/2/2001		0.4	<	0.01		NA		NA		NA		0.014		0.012
Austin	Outfall 006	8/26/2001		3.34		0.17		NA		NA		NA		0.242		0.035

Table B-5: Water Quality Monitoring Data for Metals

City	Location	Date	Mercury		Lead		Zinc		Copper		Cadmium		Selenium	
				ug/L		ug/L		ug/L		ug/L		ug/L		ug/L
Corpus Christi	TxDOT	9/14/2000		NA	<	5		62		7	<	1		NA
Corpus Christi	TxDOT	11/4/2000		NA		12		182		21	<	1		NA
Corpus Christi	TxDOT	12/26/2000		NA		11		190		20	<	1		NA
Corpus Christi	TxDOT	1/10/2001		NA		6		223		13	<	1		NA
Corpus Christi	TxDOT	3/2/2001		NA		7		134		13	<	1		NA

City	Location	Date	Mercury		Lead		Zinc		Copper		Cadmium		Selenium	
				ug/L		ug/L		ug/L		ug/L		ug/L		ug/L
Corpus Christi	TxDOT	3/27/2001		NA		12.6		237		28.4	<	1		NA
Corpus Christi	TxDOT	5/21/2001		NA		12.3		213		13.8	<	1		NA
San Antonio	Leon Creek Outfall	10/17/1999		NA		5		80		5.3		0.16		NA
San Antonio	Leon Creek Outfall	2/23/2000		NA		14		150		9.2		0.33		NA
San Antonio	Leon Creek Outfall	5/19/2000		NA		12		114		7.6		0.24		NA
San Antonio	Leon Creek Outfall	9/12/2000		NA		11		51		8.3		0.3		NA
San Antonio	Leon Creek Outfall	11/2/2000		NA		6		42		4		0.15		NA
Beaumont	TxDOT 001 Outfall	05/01/00 - 09/30/00		NA		10		115		20	<	0.1		NA
Beaumont	TxDOT 001 Outfall	10/01/00 - 12/31/00		NA		7		191		12		0		NA
Beaumont	TxDOT 001 Outfall	01/01/01 - 04/30/01		NA		12		152		10		0		NA
Beaumont	TxDOT 001 Outfall	05/01/01 - 09/30/01		NA		0		85		0		0		NA
Beaumont	TxDOT 002 Outfall	01/01/00 - 03/01/00		NA		19		276		13	<	0.1		NA
Beaumont	TxDOT 002 Outfall	05/01/00 - 09/30/00		NA	<	5		102		5	<	0.1		NA
Beaumont	TxDOT 002 Outfall	10/01/00 - 12/31/00		NA		0		108		0		0		NA
Beaumont	TxDOT 002 Outfall	01/01/01 - 04/30/01		NA		8		170		15		0		NA
Beaumont	TxDOT 002 Outfall	05/01/01 - 09/30/01		NA		9000		151		0		0		NA
Houston	Loop 610	2/20/1999	<	0.2	<	5		80		14	<	1		NA
Houston	Loop 610	4/26/1999	<	0.2		30		250		39	<	1		NA
Houston	Loop 610	11/22/1999		0.2		357		409		67.5		1.07		NA
Houston	Loop 610	12/9/1999	<	0.2		19.7		151		21.6		2.2		NA
Houston	Loop 610	6/19/2000		1.1		32		274		33.6	<	5		NA

City	Location	Date	Mercury		Lead		Zinc		Copper		Cadmium		Selenium	
				ug/L		ug/L		ug/L		ug/L		ug/L		ug/L
Houston	U.S. 59	3/19/1999	<	0.2		11		100		13	<	1		NA
Houston	U.S. 59	4/26/1999		0.2		19		200		28	<	1		NA
Houston	U.S. 59	6/25/1999		0.28		11.1		106		14.04	<	0.5		NA
Houston	U.S. 59	9/28/1999	<	0.2		11.2		132		27.6		0.45		NA
Houston	U.S. 59	12/9/1999	<	0.2		20		228		27.9		1.8		NA
Houston	U.S. 59	6/19/2000	<	0.2		6.9		135		28.1	<	1		NA
Fort Worth	Deer Creek Outfall	5/2/1994	<	0.1		8		60		7		0.5	<	1
Fort Worth	Deer Creek Outfall	5/9/1994	<	0.1		7		60		6		0.5	<	1
Fort Worth	Deer Creek Outfall	8/21/1994	<	0.1		4		30		4		0.5	<	1
Fort Worth	Deer Creek Outfall	8/31/1994	<	0.1		11		80		6		0.5	<	1
Fort Worth	Deer Creek Outfall	10/7/1994	<	0.1		14		60		17		5	<	1
Fort Worth	Deer Creek Outfall	11/2/1994	<	0.1		5		40		4		0.5	<	1
Fort Worth	Deer Creek Outfall	11/9/1994	<	0.1		3		30		3		0.5	<	1
Fort Worth	Deer Creek Outfall	2/6/1997		NA		8		70		8		0.5		NA
Fort Worth	Deer Creek Outfall	2/12/1997		NA		11		60		5		0.5		NA
Fort Worth	Deer Creek Outfall	3/12/1997		NA		10		60		8		0.5		NA
Fort Worth	Deer Creek Outfall	3/25/1997		NA		9		40		6		0.5		NA
Fort Worth	Deer Creek Outfall	4/3/1997		NA		8		30		5		0.5		NA
Fort Worth	Deer Creek Outfall	10/7/1997		NA		5		40		5		0.5		NA
Fort Worth	Deer Creek Outfall	5/27/1998		NA		38		130		12		0.5		NA
Fort Worth	Deer Creek	12/18/1998		NA		13		90		11		0.5		NA

City	Location	Date	Mercury		Lead		Zinc		Copper		Cadmium		Selenium	
				ug/L		ug/L		ug/L		ug/L		ug/L		ug/L
	Outfall													
Fort Worth	Deer Creek Outfall	3/18/1999		NA		8		66		9		0.25		NA
Fort Worth	Deer Creek Outfall	9/13/1999		NA		10		50		7		1		NA
Fort Worth	Deer Creek Outfall	3/10/2000		NA		33		160		20		1		NA
Fort Worth	Deer Creek Outfall	4/30/2000		NA		NA		NA		NA		NA		NA
Fort Worth	Deer Creek Outfall	10/29/2000		NA		25		133		14		2		NA
Fort Worth	Deer Creek Outfall	11/12/2000		NA		NA		NA		NA		NA		NA
Fort Worth	Deer Creek Outfall	1/28/2001		NA		NA		NA		NA		NA		NA
Fort Worth	Deer Creek Outfall	3/8/2001		NA		9		104		7		1		NA
Fort Worth	Deer Creek Outfall	3/24/2001		NA		NA		NA		NA		NA		NA
Dallas	Mountain Creek Outfall	12/2/1993	<	0.1		32		110		9		0.5	<	1
Dallas	Mountain Creek Outfall	1/11/1994	<	0.1		35		190		13		0.5		1
Dallas	Mountain Creek Outfall	2/28/1994	<	0.1		90		200		19		0.5	<	1
Dallas	Mountain Creek Outfall	3/8/1994	<	0.1		12		80		7		0.5	<	1
Dallas	Mountain Creek Outfall	4/11/1994	<	0.1		120		260		20		0.5	<	1
Dallas	Mountain Creek Outfall	5/9/1994	<	0.1		10		40		6		0.5	<	1
Dallas	Mountain Creek Outfall	8/20/1994	<	0.1		140		210		11		0.5	<	1
Dallas	Mountain Creek Outfall	9/3/1997		NA		53		250		20		0.5		NA
Dallas	Mountain Creek Outfall	10/21/1997		NA		8		40		11		0.5		NA

City	Location	Date	Mercury		Lead		Zinc		Copper		Cadmium		Selenium	
				ug/L		ug/L		ug/L		ug/L		ug/L		ug/L
Dallas	Mountain Creek Outfall	12/2/1997		NA		5		20		6		0.5		NA
Dallas	Mountain Creek Outfall	3/30/1998		NA		12		80		10		0.5		NA
Dallas	Mountain Creek Outfall	10/2/1998		NA		450		840		85		3		NA
Dallas	Mountain Creek Outfall	11/1/1998		NA		25		60		9		0.5		NA
Dallas	Mountain Creek Outfall	11/29/1998		NA		82		240		26		0.5		NA
Dallas	Mountain Creek Outfall	3/18/1999		NA		7		46		12		0.25		NA
Dallas	Mountain Creek Outfall	12/9/1999		NA		175		570		35		2		NA
Dallas	Mountain Creek Outfall	3/10/2000		NA		40		140		20		1		NA
Dallas	Mountain Creek Outfall	4/30/2000		NA		13		20		14		1		NA
Dallas	Mountain Creek Outfall	10/29/2000		NA		61		332		29		3		NA
Dallas	Mountain Creek Outfall	11/12/2000		NA		5		30		9		1		NA
Dallas	Mountain Creek Outfall	1/10/2001		NA		NA		NA		NA		NA		NA
Dallas	Mountain Creek Outfall	1/16/2001		NA		NA		NA		NA		NA		NA
Dallas	Mountain Creek Outfall	1/27/2001		NA		8		30		6		1		NA
Dallas	Mountain Creek Outfall	2/9/2001		NA		57		246		26		1		NA
Dallas	Mountain Creek Outfall	2/13/2001		NA		NA		NA		NA		NA		NA
Dallas	Mountain Creek Outfall	2/27/2001		NA		5		65		8		1		NA
Dallas	Mountain Creek Outfall	3/8/2001		NA		2		35		8		1		NA
Fort Worth	Fish Creek Outfall	2/28/1994	<	0.1		15		40		11		0.5	<	1

City	Location	Date	Mercury		Lead		Zinc		Copper		Cadmium		Selenium	
				ug/L		ug/L		ug/L		ug/L		ug/L		ug/L
Fort Worth	Fish Creek Outfall	3/8/1994	<	0.1		11		50		12		0.5	<	1
Fort Worth	Fish Creek Outfall	5/9/1994	<	0.1		8		30		10		0.5	<	1
Fort Worth	Fish Creek Outfall	10/7/1994	<	0.1		11		50		10		0.5	<	1
Fort Worth	Fish Creek Outfall	10/24/1994	<	0.1		21		50		8		0.5	<	1
Fort Worth	Fish Creek Outfall	11/2/1994	<	0.1		8		20		7		0.5	<	1
Fort Worth	Fish Creek Outfall	11/9/1994	<	0.1		27		60		7		0.5	<	1
Dallas	Bachman Branch Outfall	12/2/1993	<	0.1		26		240		20		1	<	1
Dallas	Bachman Branch Outfall	1/11/1994	<	0.1		13		100		16		0.5	<	1
Dallas	Bachman Branch Outfall	2/28/1994	<	0.1		11		80		13		0.5	<	1
Dallas	Bachman Branch Outfall	3/8/1994	<	0.1		22		120		17		0.5	<	1
Dallas	Bachman Branch Outfall	4/11/1994	<	0.1		9		80		14		0.5	<	1
Dallas	Bachman Branch Outfall	5/9/1994	<	0.1		6		50		23		0.5	<	1
Dallas	Bachman Branch Outfall	8/5/1994	<	0.1		10		120		17		0.5	<	1
Dallas	Bachman Branch Outfall	1/11/1998		NA		23		100		14		0.5		NA
Dallas	Bachman Branch Outfall	4/14/1999		NA		20		199		28.7		0.25		NA
Dallas	Bachman Branch Outfall	12/4/1999		NA		30		400		15		0.5		NA
Dallas	Bachman Branch Outfall	10/6/2000		NA		5		60		26		1		NA
Dallas	Bachman Branch Outfall	10/20/2000		NA		20		194		40		1		NA
Dallas	Bachman Branch Outfall	11/12/2000		NA		20		140		23		1		NA

City	Location	Date	Mercury	Lead	Zinc	Copper	Cadmium	Selenium
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Dallas	Bachman Branch Outfall	1/10/2001	NA	NA	NA	NA	NA	NA
Dallas	Bachman Branch Outfall	2/9/2001	NA	NA	NA	NA	NA	NA
Dallas	Bachman Branch Outfall	3/8/2001	NA	2	109	20	1	NA
Austin	35th Street	9/14/1993	NA	24.13	NA	36.51	NA	NA
Austin	35th Street	10/13/1993	NA	435.54	276.40	38.22	NA	NA
Austin	35th Street	10/20/1993	NA	116.24	181.36	53.64	NA	NA
Austin	35th Street	10/20/1993	NA	235.83	356.75	77.56	NA	NA
Austin	35th Street	10/20/1993	NA	227.17	343.72	81.87	NA	NA
Austin	35th Street	10/29/1993	NA	92.39	244.13	59.92	NA	NA
Austin	35th Street	11/2/1993	NA	192.07	287.73	70.97	NA	NA
Austin	35th Street	12/22/1993	NA	129.84	215.02	57.12	NA	NA
Austin	35th Street	1/13/1994	NA	33.00	55.66	15.00	NA	NA
Austin	35th Street	1/20/1994	NA	42.40	355.76	52.15	NA	NA
Austin	35th Street	1/22/1994	NA	49.64	297.78	40.07	NA	NA
Austin	35th Street	2/22/1994	NA	122.92	229.32	121.93	NA	NA
Austin	35th Street	2/28/1994	NA	265.71	592.80	43.12	NA	NA
Austin	35th Street	3/9/1994	NA	151.88	305.68	NA	NA	NA
Austin	35th Street	3/13/1994	NA	NA	NA	NA	NA	NA
Austin	35th Street	3/15/1994	NA	95.24	208.42	24.45	NA	NA
Austin	35th Street	3/27/1994	NA	NA	NA	NA	NA	NA
Austin	35th Street	4/5/1994	NA	225.58	263.13	49.75	NA	NA
Austin	35th Street	4/11/1994	NA	212.69	508.79	69.96	NA	NA
Austin	35th Street	4/15/1994	NA	180.44	395.79	48.83	NA	NA
Austin	35th Street	4/19/1994	NA	NA	NA	NA	NA	NA
Austin	35th Street	4/28/1994	NA	NA	NA	NA	NA	NA

City	Location	Date	Mercury		Lead		Zinc		Copper		Cadmium		Selenium	
				ug/L		ug/L		ug/L		ug/L		ug/L		ug/L
Austin	35th Street	4/29/1994		NA		56.53		161.03		20.36		NA		NA
Austin	35th Street	5/2/1994		NA		0.00		33.97		18.7994		NA		NA
Austin	35th Street	5/2/1994		NA		35.00		39.00		2.0000		NA		NA
Austin	35th Street	6/3/1994		NA		349.39		497.13		50		NA		NA
Austin	35th Street	6/13/1994		NA		205.00		675.00		72		NA		NA
Austin	35th Street	6/14/1994		NA		62.65		176.31		29		NA		NA
Austin	35th Street	8/14/1994		NA		14.00		132.04		5.420		NA		NA
Austin	35th Street	8/15/1994		NA		14.00		82.69		2.437		NA		NA
Austin	35th Street	8/21/1994	<	0.2	<	42.00		158.00		24.000	<	4.00	<	75.00
Austin	35th Street	8/22/1994		NA		27.82		130.54		20.690		NA		NA
Austin	35th Street	9/8/1994		NA		14.11		247.97		34.305		NA		NA
Austin	35th Street	9/9/1994		NA		7.00		94.99		15.741		NA		NA
Austin	35th Street	9/15/1994		NA		7.00		143.47		6.044		NA		NA
Austin	35th Street	10/7/1994	<	0.2		84.05		191.54		27.987	<	4.00	<	75.00
Austin	35th Street	10/25/1994		NA		15.36		57.35		4.825		NA		NA
Austin	35th Street	10/28/1994		NA		27.47		204.05		28.763		NA		NA
Austin	35th Street	11/15/1994	<	0.2		NA		NA		NA	<	4.00	<	75.00
Austin	35th Street	12/2/1994		NA		12.26		106.95		12.730		NA		NA
Austin	35th Street	12/9/1994		NA		7.00		68.00		12.000		NA		NA
Austin	35th Street	12/14/1994		NA		18.69		148.98		20.092		NA		NA
Austin	35th Street	12/15/1994		NA		19.26		111.16		15.038		NA		NA
Austin	35th Street	2/11/1995		NA		26.00		192.00		62.000		NA		NA
Austin	35th Street	2/24/1995		NA		36.72		316.41		68.168		NA		NA
Austin	35th Street	3/7/1995		NA		22.54		101.69		21.038		NA		NA
Austin	35th Street	3/13/1995		NA		NA		NA		NA		NA		NA
Austin	35th Street	4/20/1995		NA		NA		NA		NA		NA		NA
Austin	35th Street	5/8/1995		NA		NA		NA		NA		NA		NA

City	Location	Date	Mercury		Lead		Zinc		Copper		Cadmium		Selenium	
				ug/L		ug/L		ug/L		ug/L		ug/L		ug/L
Austin	35th Street	5/18/1995		NA		NA		NA		NA		NA		NA
Austin	Convict Hill	4/29/1994		NA		NA		63.00		15.33		NA		NA
Austin	Convict Hill	5/2/1994		NA		NA		80.50		19.83		NA		NA
Austin	Convict Hill	5/13/1994		NA		141.00		173.50		10.25		NA		NA
Austin	Convict Hill	5/14/1994		NA		90.00		99.00		8.50		NA		NA
Austin	Convict Hill	5/16/1994		NA		33.00		53.00		2.00		NA		NA
Austin	Convict Hill	6/10/1994		NA		222.50		310.00		31.50		NA		NA
Austin	Convict Hill	6/19/1994		NA		99.50		291.50		10.50		NA		NA
Austin	Convict Hill	6/21/1994		NA		170.67		33.33		1.00		NA		NA
Austin	Convict Hill	8/8/1994	<	0.2		21.00		42.00		3.00	<	4.00	<	75.00
Austin	Convict Hill	8/9/1994		NA		7.00		10.00		1.00		NA		NA
Austin	Convict Hill	8/16/1994		NA		7.00		27.50		1.00		NA		NA
Austin	Convict Hill	8/22/1994		NA		12.00		17.20		2.00		NA		NA
Austin	Convict Hill	9/7/1994		NA		17.00		79.00		9.00		NA		NA
Austin	Convict Hill	9/8/1994		NA		15.50		21.50		2.50		NA		NA
Austin	Convict Hill	9/9/1994		NA		7.00		27.75		7.50		NA		NA
Austin	Convict Hill	10/7/1994		NA		11.00		18.67		3.00		NA		NA
Austin	Convict Hill	10/14/1994	<	0.2		21.00		55.00		3.00	<	4.00	<	75.00
Austin	Convict Hill	10/25/1994		NA		9.00		15.50		2.75		NA		NA
Austin	Convict Hill	10/27/1994		NA		13.75		215.00		7.25		NA		NA
Austin	Convict Hill	11/5/1994		NA		12.75		45.25		7.25		NA		NA
Austin	Convict Hill	11/15/1994		NA		14.00		81.00		6.00		NA		NA
Austin	Convict Hill	12/2/1994		NA		7.00		52.00		7.00		NA		NA
Austin	Convict Hill	12/9/1994	<	0.2		NA		NA		NA	<	4.00	<	75.00
Austin	Convict Hill	12/15/1994		NA		15.25		37.06		3.97		NA		NA
Austin	Convict Hill	1/13/1995		NA		14.00		35.11		4.79		NA		NA
Austin	Convict Hill	2/13/1995		NA		24.00		75.00		32.00		NA		NA

City	Location	Date	Mercury		Lead		Zinc		Copper		Cadmium		Selenium	
				ug/L		ug/L		ug/L		ug/L		ug/L		ug/L
Austin	Convict Hill	2/24/1995		NA		26.79		118.49		31.97		NA		NA
Austin	Convict Hill	3/7/1995		NA		26.80		48.57		14.40		NA		NA
Austin	Convict Hill	3/13/1995		NA		23.96		42.32		23.94		NA		NA
Austin	Convict Hill	3/16/1995		NA		NA		NA		NA		NA		NA
Austin	Convict Hill	4/4/1995		NA		NA		NA		NA		NA		NA
Austin	Convict Hill	4/18/1995		NA		NA		NA		NA		NA		NA
Austin	Convict Hill	4/19/1995		NA		NA		NA		NA		NA		NA
Austin	Convict Hill	4/20/1995		NA		NA		NA		NA		NA		NA
Austin	Convict Hill	5/8/1995		NA		NA		NA		NA		NA		NA
Austin	Convict Hill	5/18/1995		NA		NA		NA		NA		NA		NA
Austin	Convict Hill	2/23/2000	<	0.5		1.00	<	10.00	<	10	<	2		NA
Austin	Convict Hill	5/2/2000	<	0.5	<	5.00		50.00		10	<	2		NA
Austin	Convict Hill	10/7/2000	<	0.5		9.00		100.00	<	10	<	2		NA
Austin	Convict Hill	1/10/2001	<	0.5		3.00		30.00	<	10	<	2		NA
Austin	Convict Hill	5/4/2001	<	0.5		1.00		30.00		17	<	2		NA
Austin	Convict Hill	8/26/2001	<	0.5		2.00		49.00		4		2		NA
Austin	Convict Hill	11/15/2001		NA		NA		NA		NA		NA		NA
Austin	Convict Hill	12/8/2001	<	0.5		5.00		35.00		10	<	2		NA
Austin	Convict Hill	12/11/2001	<	0.5		14.00		34.00		7	<	2		NA
Austin	Convict Hill	3/19/2002	<	0.5		2.00		20.00	<	10	<	2		NA
Austin	Walnut Creek Rd	10/17/1994		NA		7.00		74.00		8.00		NA		NA
Austin	Walnut Creek Rd	11/5/1994		NA		9.50		14.75		5.75		NA		NA
Austin	Walnut Creek Rd	11/15/1994		NA		NA		104.75		13.25		NA		NA
Austin	Walnut Creek Rd	12/2/1994		NA		7.00		56.00		9.00		NA		NA
Austin	Walnut Creek Rd	12/14/1994		NA		NA		NA		NA		NA		NA
Austin	Walnut Creek Rd	1/13/1995		NA		16.75		41.75		4.00		NA		NA
Austin	Walnut Creek Rd	2/13/1995		NA		20.00		105.00		22.00		NA		NA

City	Location	Date	Mercury	Lead	Zinc	Copper	Cadmium	Selenium
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Austin	Walnut Creek Rd	2/24/1995	NA	32.45	147.46	36.73	NA	NA
Austin	Walnut Creek Rd	3/13/1995	NA	17.44	45.21	24.64	NA	NA
Austin	Walnut Creek Rd	3/16/1995	NA	14.00	124.00	17.00	NA	NA
Austin	Walnut Creek Rd	4/4/1995	NA	3.96	26.60	3.68	NA	NA
Austin	Walnut Creek Rd	4/20/1995	NA	NA	NA	NA	NA	NA
Austin	Walnut Creek Rd	5/8/1995	NA	NA	NA	NA	NA	NA
Austin	Walnut Creek Rd	2/29/1996	NA	54.32	177.95	NA	NA	NA
Austin	Walnut Creek Rd	3/26/1996	NA	42.00	181.56	NA	NA	NA
Austin	Walnut Creek Rd	4/5/1996	NA	42.00	138.66	NA	NA	NA
Austin	Walnut Creek Rd	4/28/1996	NA	115.04	124.88	NA	NA	NA
Austin	Walnut Creek Rd	5/27/1996	NA	123.50	52.44	NA	NA	NA
Austin	Walnut Creek Rd	6/4/1996	NA	85.80	42.83	NA	NA	NA
Austin	Walnut Creek Rd	6/22/1996	NA	117.26	110.48	NA	NA	NA
Austin	Walnut Creek Rd	6/25/1996	NA	180.72	75.53	NA	NA	NA
Austin	Walnut Creek Rd	8/22/1996	NA	103.36	35.95	NA	NA	NA
Austin	Walnut Creek Rd	8/23/1996	NA	44.22	23.76	NA	NA	NA
Austin	Walnut Creek Rd	8/29/1996	NA	82.51	24.73	NA	NA	NA
Austin	Walnut Creek Rd	10/17/1996	NA	190.56	366.94	NA	NA	NA
Austin	Walnut Creek Rd	10/27/1996	NA	42.00	50.00	NA	NA	NA
Austin	Walnut Creek Rd	11/7/1996	NA	68.89	11.17	NA	NA	NA
Austin	Walnut Creek Rd	11/24/1996	NA	107.05	280.07	NA	NA	NA
Austin	Walnut Creek Rd	12/4/1996	NA	64.08	85.41	NA	NA	NA
Austin	Walnut Creek Rd	12/15/1996	NA	60.77	7.24	NA	NA	NA
Austin	Walnut Creek Rd	2/6/1997	NA	146.79	78.04	NA	NA	NA
Austin	Walnut Creek Rd	2/12/1997	NA	92.82	93.30	NA	NA	NA
Austin	Walnut Creek Rd	3/10/1997	NA	NA	280.43	NA	NA	NA
Austin	Walnut Creek Rd	3/25/1997	NA	NA	131.09	NA	NA	NA

City	Location	Date	Mercury	Lead	Zinc	Copper	Cadmium	Selenium
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Austin	Walnut Creek Rd	4/2/1997	NA	NA	341.50	NA	NA	NA
Austin	Walnut Creek Rd	4/25/1997	NA	NA	225.63	NA	NA	NA
Austin	Walnut Creek Rd	5/27/1997	NA	NA	158.24	NA	NA	NA
Austin	Walnut Creek Swales	4/29/1994	NA	NA	40.85	NA	NA	NA
Austin	Walnut Creek Swales	4/30/1994	NA	NA	24.36	NA	NA	NA
Austin	Walnut Creek Swales	5/2/1994	NA	NA	20.02	NA	NA	NA
Austin	Walnut Creek Swales	5/28/1994	NA	NA	NA	NA	NA	NA
Austin	Walnut Creek Swales	10/18/1994	NA	6.92	30.71	NA	NA	NA
Austin	Walnut Creek Swales	5/8/1995	NA	NA	NA	NA	NA	NA
Austin	Walnut Creek Swales	12/20/1995	NA	42.68	27.56	NA	NA	NA
Austin	Walnut Creek Swales	2/29/1996	NA	42.00	22.68	NA	NA	NA
Austin	Walnut Creek Swales	6/4/1996	NA	101.23	2.69	NA	NA	NA
Austin	Walnut Creek Swales	6/7/1996	NA	155.33	2.00	NA	NA	NA
Austin	Walnut Creek Swales	8/11/1996	NA	130.47	4.93	NA	NA	NA
Austin	Walnut Creek Swales	8/22/1996	NA	100.56	2.00	NA	NA	NA
Austin	Walnut Creek Swales	8/23/1996	NA	47.64	3.12	NA	NA	NA
Austin	Walnut Creek Swales	8/29/1996	NA	53.65	2.00	NA	NA	NA
Austin	Walnut Creek Swales	11/24/1996	NA	60.90	3.30	NA	NA	NA
Austin	Walnut Creek Swales	12/4/1996	NA	110.88	18.32	NA	NA	NA
Austin	Walnut Creek Swales	12/15/1996	NA	61.87	2.57	NA	NA	NA

City	Location	Date	Mercury		Lead		Zinc		Copper		Cadmium		Selenium	
				ug/L		ug/L		ug/L		ug/L		ug/L		ug/L
Austin	Walnut Creek Swales	2/7/1997		NA		84.43		60.18		NA		NA		NA
Austin	Walnut Creek Swales	2/12/1997		NA		NA		44.01		NA		NA		NA
Austin	Walnut Creek Swales	3/10/1997		NA		NA		66.69		NA		NA		NA
Austin	Walnut Creek Swales	3/25/1997		NA		NA		121.91		NA		NA		NA
Austin	Walnut Creek Swales	4/25/1997		NA		NA		146.84		NA		NA		NA
Austin	Walnut Creek Swales	2/23/2000	<	0.5		10.00		10.00	<	10	<	2		NA
Austin	Walnut Creek Swales	5/2/2000		NA	<	5.00	<	10.00		10	<	2		NA
Austin	Walnut Creek Swales	10/7/2000		NA	<	5.00	<	10.00	<	10	<	2		NA
Austin	Walnut Creek Swales	1/10/2001		NA		4.00		110.00	<	10	<	2		NA
Austin	Walnut Creek Swales	4/23/2001		NA		2.00		21.00	<	10	<	2		NA
Austin	Walnut Creek Swales	5/4/2001		NA	<	5.00	<	10.00	<	10	<	2		NA
Austin	Walnut Creek Swales	8/30/2001		NA	<	5.00		53.00	<	10	<	2		NA
Austin	Walnut Creek Swales	11/15/2001		NA		4.00		31.00	<	10	<	2		NA
Austin	Walnut Creek Swales	2/5/2002		NA		3.00		20.00	<	10	<	2		NA
Austin	183 Rd	5/27/1996		NA		168.28		294.44		NA		NA		NA
Austin	183 Rd	5/30/1996		NA		78.78		2.13		NA		NA		NA
Austin	183 Rd	6/22/1996		NA		197.15		459.11		NA		NA		NA
Austin	183 Rd	6/25/1996		NA		199.93		285.41		NA		NA		NA
Austin	183 Rd	8/22/1996		NA		166.02		279.28		NA		NA		NA
Austin	183 Rd	8/23/1996		NA		52.12		30.23		NA		NA		NA
Austin	183 Rd	8/29/1996		NA		75.10		145.74		NA		NA		NA

City	Location	Date	Mercury	Lead	Zinc	Copper	Cadmium	Selenium
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Austin	183 Rd	9/18/1996	NA	95.20	122.87	NA	NA	NA
Austin	183 Rd	10/17/1996	NA	285.05	1040.22	NA	NA	NA
Austin	183 Rd	10/27/1996	NA	271.20	1099.21	NA	NA	NA
Austin	183 Rd	11/7/1996	NA	42.00	125.76	NA	NA	NA
Austin	183 Rd	11/24/1996	NA	81.83	21.53	NA	NA	NA
Austin	183 Rd	12/15/1996	NA	87.81	92.50	NA	NA	NA
Austin	183 Rd	2/12/1997	NA	NA	226.71	NA	NA	NA
Austin	183 Rd	3/25/1997	NA	NA	441.65	NA	NA	NA
Austin	183 Rd	4/2/1997	NA	NA	687.69	NA	NA	NA
Austin	183 Rd	4/25/1997	NA	NA	350.34	NA	NA	NA
Austin	183 Rd	5/9/1997	NA	NA	480.84	NA	NA	NA
Austin	183 Rd	5/27/1997	NA	NA	413.49	NA	NA	NA
Austin	183 Swales	3/27/1996	NA	42.00	11.35	NA	NA	NA
Austin	183 Swales	4/5/1996	NA	42.00	3.17	NA	NA	NA
Austin	183 Swales	4/22/1996	NA	95.89	2.00	NA	NA	NA
Austin	183 Swales	5/27/1996	NA	118.84	21.66	NA	NA	NA
Austin	183 Swales	5/30/1996	NA	97.97	115.11	NA	NA	NA
Austin	183 Swales	6/22/1996	NA	118.74	2.00	NA	NA	NA
Austin	183 Swales	6/25/1996	NA	146.10	3.27	NA	NA	NA
Austin	183 Swales	8/11/1996	NA	152.61	2.00	NA	NA	NA
Austin	183 Swales	8/22/1996	NA	101.99	2.00	NA	NA	NA
Austin	183 Swales	8/23/1996	NA	57.95	2.00	NA	NA	NA
Austin	183 Swales	8/29/1996	NA	60.69	2.45	NA	NA	NA
Austin	183 Swales	9/18/1996	NA	58.57	2.00	NA	NA	NA
Austin	183 Swales	11/7/1996	NA	50.82	24.94	NA	NA	NA
Austin	183 Swales	11/24/1996	NA	44.56	25.55	NA	NA	NA
Austin	183 Swales	12/15/1996	NA	44.58	21.98	NA	NA	NA

City	Location	Date	Mercury		Lead		Zinc		Copper		Cadmium		Selenium	
				ug/L		ug/L		ug/L		ug/L		ug/L		ug/L
Austin	183 Swales	2/7/1997		NA		76.84		43.74		NA		NA		NA
Austin	183 Swales	2/12/1997		NA		NA		27.09		NA		NA		NA
Austin	183 Swales	3/11/1997		NA		NA		106.38		NA		NA		NA
Austin	183 Swales	3/25/1997		NA		NA		67.60		NA		NA		NA
Austin	183 Swales	4/2/1997		NA		NA		54.10		NA		NA		NA
Austin	183 Swales	4/25/1997		NA		NA		71.41		NA		NA		NA
Austin	183 Swales	5/9/1997		NA		NA		52.89		NA		NA		NA
Austin	183 Swales	5/27/1997		NA		NA		72.45		NA		NA		NA
Austin	Outfall 001	5/2/2000		NA	<	5.00		60.00		10	<	2		NA
Austin	Outfall 001	10/7/2000		NA		12.00		90.00	<	10	<	2		NA
Austin	Outfall 001	1/10/2001		NA		18.00		520.00		12	<	2		NA
Austin	Outfall 001	6/24/2001		NA		2.00		40.00	<	10	<	2		NA
Austin	Outfall 001	8/26/2001		NA		5.00		200.00		7		2		NA
Austin	Outfall 001	11/12/2001		NA		7.00		87.00	<	10	<	2		NA
Austin	Outfall 004	5/2/2000	<	0.5	<	5.00		110.00		20	<	2		NA
Austin	Outfall 004	11/3/2000	<	0.5	<	5.00	<	10.00	<	10	<	2		NA
Austin	Outfall 004	1/10/2001	<	0.5		1.00		10.00	<	10	<	2		NA
Austin	Outfall 004	8/26/2001	<	0.5		4.00		44.00		8		2		NA
Austin	Outfall 004	11/15/2001	<	0.5		3.00		15.00	<	10	<	2		NA
Austin	Outfall 004	2/5/2002	<	0.5	<	5.00		50.00	<	10	<	2		NA
Austin	Outfall 005	1/27/2000	<	0.5		30.00		30.00	<	10	<	2		NA
Austin	Outfall 005	5/12/2000	<	0.5	<	5.00		10.00	<	10	<	2		NA
Austin	Outfall 005	10/9/2000	<	0.5	<	5.00		20.00	<	10	<	2		NA
Austin	Outfall 005	1/10/2001	<	0.5		5.00		40.00	<	10	<	2		NA
Austin	Outfall 005	4/23/2001	<	0.5		11.00		110.00		9	<	2		NA
Austin	Outfall 005	8/26/2001	<	0.5		6.00		76.00		7		2		NA
Austin	Outfall 005	12/13/2001	<	0.5		14.00		120.00		14	<	2		NA

City	Location	Date	Mercury		Lead		Zinc		Copper		Cadmium		Selenium	
				ug/L		ug/L		ug/L		ug/L		ug/L		ug/L
Austin	Outfall 005	12/15/2001	<	0.5		3.00		26.00	<	10	<	2		NA
Austin	Outfall 005	2/5/2002	<	0.5		4.00		80.00	<	10	<	2		NA
Austin	Outfall 006	2/23/2000	<	0.5	<	5.00	<	10.00	<	10	<	2		NA
Austin	Outfall 006	5/2/2000	<	0.5	<	5.00	<	10.00		10	<	2		NA
Austin	Outfall 006	11/3/2000	<	0.5	<	5.00	<	10.00	<	10	<	2		NA
Austin	Outfall 006	3/2/2001	<	0.5		2.00	<	10.00	<	10	<	2		NA
Austin	Outfall 006	8/26/2001	<	0.5		4.00		48.00		6		2		NA

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VITA

Samantha Lye-Ming Hon was born in Petaling Jaya, Malaysia on August 19, 1979, the daughter of Susan Lim Lai Yoong and Sonny Hon Kah Kheong. After completing her work at Petaling Garden Girl's High School in Petaling Jaya, Malaysia, she entered Inti College in Malaysia before continuing her studies at the University of Oklahoma in Norman, Oklahoma. She received the degree of Bachelor of Science in Environmental Engineering in May, 2001. After completing her bachelor's degree in Oklahoma, she joined the graduate program at the University of Texas at Austin in Spring 2002.

Permanent Address: 693-5-4 Desa Kiara Condominiums
Jalan Damansara, 60000 Kuala Lumpur
Malaysia

This thesis was typed by the author